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HUFELAND'S  
ART  
OF  
PROLONGING LIFE.

EDITED BY

ERASMUS WILSON, F.R.S.



LONDON:  
JOHN CHURCHILL, PRINCES STREET, SOHO.

MDCCCLIII.



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## EDITOR'S PREFACE.

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THE "Art of Prolonging Life," by Christopher William Hufeland, a philosophic physician and professor of medicine in the University of Jena, is a work enjoying a deserved popularity in Germany, where it has gone through several editions. Though translated into English, in 1797, it is but little known in this country, less indeed, as it appeared to the Editor, than its merits deserve; and it is under the hope of being able to fill a vacant niche in popular literature, and restoring to his proper sphere of usefulness an able and accomplished instructor, that the Editor has now undertaken the present edition of his book. In its English costume, and bearing a dedication to George Christopher Lichtenberg, Counsellor of State to his Britannic Majesty, and one of the Professors in the University of Göttingen, the work was published in two octavo volumes, with respectable and roomy type, short lines, shorter pages, and broad margins, an effectual prohibition to its wide diffusion. The translation bears the impress of a master's hand; it is elegant and exact, and in the Editor's judgment is the production of the learned author's own pen. Under this belief, the Editor has selected the translation of 1794, with its pure and classic language, for the present volume, in preference to a new translation from a later German edition.

The Reader will probably be struck, as was the Editor, with the little real progress which has been

made in the science of living during the more than half a century since the original work was first written; and the feeling of a necessity for bringing the matter up to the present line of march will be dissipated by its perusal. Indeed it seemed to the Editor more fitting as a ground of wholesome reflection, that we should have placed before our eyes the philosophy of half a century back, that we might thereby learn how much still remained to be done, before our knowledge of the subject could be regarded as complete.

With an elegant translation, then, done to his hand, all that remained to the Editor was a labour of taste; to adapt the work to the modes of thinking and feeling of the present day, certain truths, too true to be allowed to stand forth in all their naked proportions, required a veil to be thrown around them; words that betrayed the foreign source of the translation, and bore a meaning different to that which would have been deduced from their construction, required to be exchanged for terms of more obvious nationality; and, in a few instances, certain elaborate disquisitions, bordering on absolute prose, needed to be expunged altogether. The temple of knowledge, at the present day, is called on to put forth all its allurements to invite mankind to enter its portals, while with equal care its harsher features must be thrown into the shade. The art of the arrangement consists in softening the rude by its combination with the refined; in accustoming the senses to the subdued tints before the more sombre shadows are developed. In this, and a few necessary notes, the whole of the Editor's labour is embraced.

HENRIETTA STREET, CAVENDISH SQUARE,  
*June, 1853.*

## P R E F A C E.

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THE life of man, physically considered, is a peculiar chemico-animal operation; a phenomenon effected by a concurrence of the united powers of Nature with matter in a continual state of change. This, like every other physical operation, must have its defined laws, boundaries, and duration, so far as they depend on the sum of the given powers and matter, their application, and many other external as well as internal circumstances; but, like every other physical operation, it can be promoted or impeded, accelerated or retarded. By laying down just principles respecting its essence and wants, and by attending to observations made from experience, the circumstances under which this process may be hastened and shortened, or retarded and prolonged, can be discovered. Upon this may be founded dietetic rules and a medical mode of treatment for preserving life; and hence arises a particular science, the MACROBIOTIC, or the art of prolonging it, which forms the subject of the present work.

This art, however, must not be confounded with the common art of medicine or medical regimen: its object, means, and boundaries are different. The object of the medical art is health; that of the macrobiotic, long life. The means employed in the medical art are regulated according to the present state of the body and its variations; those of the macrobiotic, by general

principles. In the first it is sufficient if one is able to restore that health which has been lost; but no person thinks of inquiring whether, by the means used for that purpose, life, upon the whole, will be lengthened or shortened; and the latter is often the case in many methods employed in medicine. The medical art must consider every disease as an evil which cannot be too soon expelled; the macrobiotic, on the other hand, shows that many diseases may be the means of prolonging life. The medical art endeavours, by corroborative and other remedies, to elevate mankind to the highest degree of strength and physical perfection; while the macrobiotic proves that here even there is a maximum, and that strengthening, carried too far, may tend to accelerate life, and consequently, to shorten its duration. The practical part of medicine, therefore, in regard to the macrobiotic art, is to be considered only as an auxiliary science which teaches us how to know diseases, the enemies of life, and how to prevent and expel them; but which, however, must itself be subordinate to the higher laws of the latter.

Long life has at all times been the chief wish, the principal object of mankind; but how confused and contradictory are all the plans ever proposed for obtaining it! The stern theologist derides such attempts; and asks, if the period of existence is not determined to every being—and who is able to add a hair-breadth to his stature, or a minute to the duration of his existence? The practical physician exclaims, why do you search for the particular means of prolonging life? Employ my art; take care of your health, guard against diseases, and cure those which have appeared. This is the only way to promote longevity. The adept shows his vital elixir, and boldly asserts that those

who will persevere to take that incorporated spirit of life may hope to become old. The philosopher endeavours to resolve the problem, by teaching men to despise death, and to double life by enjoyment. The innumerable legion of quacks and empirics, on the other hand, who have gained the confidence of the multitude, inspire them with a belief that there are no surer means of becoming old, than to let blood at proper times, and to use cupping, purgatives, &c.

It appeared to me, therefore, useful and necessary to rectify the ideas of the public on a matter of so much importance; and to bring this science back to solid and simple principles, by which it might acquire that connexion and systematic order of which it hath hitherto been destitute.

For eight years this subject has been the favourite employment of my leisure hours; and it will give me great happiness if it be to others only half as serviceable as it has been to me. The present melancholy age, so destructive to mankind, induced me to engage in this undertaking; and the idea of its being useful, while it afforded me the highest consolation, encouraged me to pursue my researches.

My chief aim was to establish the Art of prolonging Life on systematic grounds, and to make known the means for accomplishing that object; but, to convey a proper idea of the whole, it was necessary to comprehend some concomitant circumstances which gradually presented themselves to my notice. This, in the first place, appeared to be the best way of giving a higher interest and more general value to many dietetic rules; because I have always found that much less impression is made when one says, *this or that substance, this or that mode of living, is healthful or unhealthful*, (since



this is relative, and depends on the strength or weakness of the constitution as well as on other points, and has a reference to the immediate consequences, which are often imperceptible, and therefore make those who are not physicians disbelieve the whole,) than when the proposition is thus expressed—*these things, these modes of living, prolong or shorten life*; for this depends less on circumstances, and cannot be judged of from the immediate consequences. And, secondly, this work insensibly became a repository to which I committed many of my favourite ideas; where I indulged in many digressions suited to a citizen of the world, and was happy to have it in my power to connect these ideas by a thread so beautiful and so extensive in joining everything as the thread of life.

According to the point of view under which I necessarily considered my subject, it was natural that I should treat it, not only medically, but also morally; for, how is it possible to write on human life, without taking into consideration its connexion with the moral world, to which it so peculiarly belongs? On the contrary, I have found more than once, in the course of my labour, that the physical man cannot be separated from his higher moral object:—and I may, perhaps, reckon it a small merit in the present performance, that it will not only establish the truth and heighten the value of the moral laws, in the eyes of many, by showing that they are indispensably necessary for the physical support and prolongation of life—but that it demonstrates, that the physical nature of man has been suited to his higher moral destination; that this makes an essential difference between the nature of man and the nature of animals; that without moral cultivation man is in continual contradiction with his own nature;

and that, by culture alone, he becomes even physically perfect. May I be so fortunate, by these means, as to accomplish two objects: not only to render the life of man more healthful and longer; but also, by exciting his exertions for that purpose, to make him better and more virtuous! I can at any rate assert, that man will in vain seek for the one without the other, and that physical and moral health are as nearly related as the body and the soul. They flow from the same sources; become blended together; and when united, the result is, HUMAN NATURE ENNOBLED AND RAISED TO PERFECTION.

I must here observe, that as this work is not designed merely for physicians, but for the public in general, I was obliged in some points to be more diffuse, and in others shorter, than if I had written for the former alone. I had, in particular, a regard to young people; because I am convinced that the grounds of a long or a short life can be most effectually laid at an early period; and that, through unpardonable negligence in the education of youth, information on this subject, so important to their physical happiness, is entirely forgotten. I have, therefore, placed in the clearest light those points most necessary to be known at an early age; and, in general, have treated my subject so that the book may be put into the hands of young persons without any danger:—and it will afford me inexpressible joy if it be not only recommended to them, but employed also in schools, to convey instruction respecting their physical well-being—which must indeed be given in such seminaries, as I unfortunately know, by long experience, that in colleges it will be for the most part too late.

My readers, I hope, will forgive me for not sup-

porting with quotations every instance I have adduced, and every fact related. My motive for omitting them was an apprehension of swelling the work too much, and of rendering it too expensive. I must, however, remark, that the instances given of the age of man are taken chiefly from Bacon's *HISTORIA VITÆ ET MORTIS*.

To conclude, I will readily allow, that many parts of this work might have been written in a better and fuller manner; but I console myself with the agreeable persuasion, which no one can deprive me of, that what I have said may be useful, and that its utility will recommend it, and procure it support.

JENA, *July*, 1796.



# ART OF PROLONGING LIFE.

## PART THE FIRST.

### CHAPTER I.

State of this Science among the Egyptians and the Greeks ; Gymnastic: Gerocomic; Hermippus. State of it in the middle ages; Theophrastus Paracelsus. Astrological method. Talismans. Thurneiser. Cornaro, and his severe regimen. Method by transfusion. Lord Bacon. St. Germain. Mesmer.

THAT incomprehensible power, that immediate influence of the Deity which we call the vital principle, pervades all nature. We everywhere behold phenomena and effects which evidently announce its presence, though under an infinite variety of modifications and forms; and the existence of life is proclaimed by the whole universe around us. Life is that by which plants vegetate, by which animals feel and are actuated ; but in the highest degree of perfection, sensation and form, it appears, in man, the supreme link of the visible creation. If we survey the whole chain of being, we shall nowhere find so complete a combination of almost all the vivifying powers of nature ; nowhere so much vital energy, united with so long duration, as here. It needs excite no surprise, therefore, that the most perfect possessor of this benefit should value it so highly ; and that the bare idea of living and existing should be attended with so much pleasure. All bodies become the more interesting to us, the more we can ascribe to them a

kind of life and vital sensation. Nothing can engage our attention so much; nothing induce us to make so great sacrifices, and to call forth the most extraordinary display and exertion of our most secret powers, as the desire of preserving life, and of saving it in the moment of danger. To those, even, who are deprived of its comforts and enjoyments; to those who suffer under the pain of incurable disease, or who bewail the loss of freedom in the gloom of a dungeon, the idea of living and existing presents some charms; and it certainly requires a derangement of the finest organs of sensation, a circumstance possible only in man; a total darkening and deadening of the mental faculties, to render life to us either disgusting or indifferent. In so wise and intimate a manner is the love of life, that desire so worthy of a thinking being, that grand pillar of individual and public felicity interwoven with our frame. It was very natural for men, therefore, to conceive the idea whether it might not be possible to prolong our existence, and to give more extent to the too fleeting enjoyment of so valuable a blessing. This question, indeed, has, at all times, engaged the attention of mankind, and in different ways. It has been a favourite object of the deepest thinking minds; it has afforded a fine field for visionaries; and has been the principal allurements employed by quacks and impostors: for we shall find that intercourse with spirits, the secret of making gold, or the art of prolonging life, were the pretences by which they deluded the multitude, and imposed on the credulity of the public. It is interesting, and may contribute something towards the history of the human mind, to see by what various, and often contrary, means people hoped to obtain that benefit; and, as in latter times, a Cagliostro and a Mesmer have supplied considerable materials for this subject, I hope I shall be forgiven if I here take a short view, before I proceed to my main purpose, of the principal methods that have been employed to lengthen the duration of life.

An idea of this kind prevailed, even in the earliest ages, among the Egyptians, the Greeks, and the Romans. In Egypt, a country which gave birth to so many romantic notions, means were devised for the attainment of this object; and it is not improbable that such researches may have been occasioned by the unhealthfulness of the climate, owing to its great heat, and the inundations of the Nile. It was believed there, that life could be prolonged by the continued use of emetics and sudorifics. It was, therefore, a general custom to take, at least, two emetics every month; and instead of saying, How do you find yourself? one asked another, How do you perspire? This passion among the Greeks, under the influence of a pure and serene atmosphere, assumed a different direction. These people were persuaded that a rational enjoyment of nature, and the continual exercise of their powers, were the surest means of strengthening the vital principle, and of prolonging life. Hippocrates, and all the physicians and philosophers of that period, knew no other method of accomplishing this end than by moderation; the use of free and pure air; bathing; and, above all, by daily friction of the body and exercise. Particular directions and rules were laid down for giving violent and gentle motion to the body in a variety of ways: a particular art, called the *Gymnastic*, hence arose; and the greatest philosophers and men of learning never forgot that the body and the soul ought to be exercised in the same proportion. This art, to us almost unknown, of suiting exercise to the different constitutions, situations and wants of man; of employing it, above all, as the means of keeping his internal nature in proper activity, and thereby not only rendering the causes of disease ineffectual, but also curing diseases which have already appeared, they, indeed, brought to an extraordinary degree of perfection. One Herodicus, we are told, carried these ideas so far that he compelled his patients to walk; to suffer their bodies to be rubbed; and, the more the disease weakened them, to

endeavour to overcome that weakness by strengthening the muscular powers : and he had the good fortune to lengthen several years, by this method, the lives of so many enfeebled patients, that Plato reproached him with having acted very unjustly towards these unfortunate people, in prolonging, by artificial means, that existence of which they would always have less and less enjoyment. The clearest ideas and most agreeable to nature on preserving and lengthening life may be found in Plutarch, who, by the happiest old age, confirmed the truth of his prescriptions. His information on this subject, he concludes with the following rules, which may suit also the present age : “Keep your head cool, and your feet warm ; instead of employing medicine for every indisposition, rather fast a day ; and while you attend to the body, never neglect the mind.”

A singular method of prolonging life, ascribed also to the earliest ages, was the *Gerocomic* ; or the custom of inspiring new strength and vigour into a body enfeebled under a load of years, by exposing it to the effluvia of fresh and blooming youth. A well-known instance of this practice may be found in the history of King David ; and we learn from several passages in the writings of the ancient physicians, that it was formerly much used, and considered as of great efficacy in relieving the infirmities of age. Even in modern times this prescription has been followed with advantage. The great Boerhaave caused an old burgomaster of Amsterdam to sleep between two young persons ; and he assures us that the old man acquired by these means a visible increase of vigour and activity. When one, indeed, reflects what change may be produced on diseased limbs by the vital evaporation of animals newly killed, and what may be the consequence of applying living animals to parts affected with pain, this method will appear not to be altogether despicable.

It is highly probable that the great value which the Greeks and the Romans set upon inspiring pure sound breath may have been founded on these ideas ; and the

following ancient inscription, discovered at Rome in the last century, seems to allude to this subject:—

Æsculapio et Sanitati.  
 L. Clodius Hermippus,  
 Qui vixit annos cxv. dies v.  
 Puellarum anhelitu,  
 Quod etiam post mortem ejus  
 Non parum mirantur physici,  
 Jam posterì, sic vitam ducite.

To Æsculapius and Health  
 Dedicated  
 By L. Clodius Hermippus,  
 Who lived cxv years v days  
 By the breath of young maids.

Whether this inscription be authentic or not, it gave occasion, in the beginning of the present century, to a work in which one Dr. Cohauscn endeavours, with much learning, to prove that Hermippus was the master of a training school, or teacher of female children, at Rome, who, by living continually amidst a circle of young maids, had been enabled to prolong his life to so great an age. He advises people, therefore, with much benevolence, to expose themselves, every evening and morning, to the breath of young innocent maidens; and asserts, that they will thereby contribute, in an incredible degree, to the strengthening and preserving the vital power; as, according to the saying of the adepts, the *first matter* is contained purest in the breath of innocence.

But that long period of darkness during the middle ages, when all clear and natural conceptions were banished by fanaticism and superstition; when the speculative indolence of the cloister gave rise to some chemical and physical discoveries, which served rather to bewilder than enlighten the understanding, and tended more to promote credulity than enlarge knowledge, was the most fertile in romantic notions on this subject. It was during this night of ignorance that the most monstrous chimeras of the human mind were produced; and that those absurd



ideas of witchcraft, sympathy, the philosopher's stone, occult qualities, chiromaney, cabala, universal remedies, were established, or at least propagated in the world; and which unfortunately yet prevail, and, though in a changed and modernised form, are still employed to mislead mankind. Amidst that mental darkness an opinion arose, that the preservation and prolongation of life, which, as the gift of nature, had been hitherto sought for by the most natural means, could be obtained by chemical transmutations, by the help of the *first matter* which men thought they had caught in retorts, by guarding against the influence of malignant constellations, and by other ridiculous conceits of the like kind. I hope I shall, therefore, be here permitted to mention a few of the plans then proposed to mankind, which, notwithstanding their absurdity, were nevertheless credited.

One of the most impudent quacks and greatest boasters among the prolongers of life was Theophrastus Paracelsus, or, as he is better characterized by his whole name, Philippus Aureolus Theophrastus Paracelsus Bombastus ab Hohenheim. He had travelled over half the world; had collected receipts and wonder-working medicines from all quarters and corners; and, in particular, which was very uncommon, had studied in mines the nature and management of metals. He began his career by depreciating everything before taught; by treating all the great public seminaries with the utmost contempt; by giving himself out as the first physician and philosopher in the world; and by solemnly asserting that there was no disease which he could not cure, no life which he could not prolong. As a proof of his insolence, and of the high tone in which the quacks of the fifteenth century addressed the public, I shall here quote the beginning of his principal work:—"Ye must give way to me, and not I to you; ye must give way to me, Avicenna, Rhases, Galen, Mesue; ye must give way to me, ye of Paris, ye of Montpellier, ye of Swabia, ye of Misnia, ye of Cologne, ye of Vienna, and whatever places lie on the Danube and

the Rhine: ye islands in the sea; thou Italian, thou Dalmatian, thou Athenian, thou Greek, thou Arabian, thou Israelite; you must give way to me, and not I to you. The monarchy is mine!" One may readily perceive that this author was not in the wrong when he said, "I am not fine-spun by nature;" but he had the art of clothing his absurdities in so dark and mysterious language, that people imagined they contained the deepest secrets which they here and there sought to discover; and that, at any rate, it was impossible to contradict him. By these means, and by the new and accidental effects of some chemical preparations which he first introduced into medicine, he attracted great notice; and his fame was so far extended, that pupils and patients flocked to him from every part of Europe; and that even an Erasmus did not disdain to consult him. He died, however, in the fiftieth year of his age, though he possessed the stone of immortality; and when this vegetable sulphur is closely examined, it is found to be nothing else than a hot substance much like the liquor of Hoffmann.

But it was not enough that recourse should be had to chemistry and the world of spirits in order to prolong our days; the stars also must be employed for that purpose. It was at the above period commonly believed, that the influence of the stars, which people could not allow themselves to suppose idle, ruled over the lives and fortunes of men; that every planet or constellation could give to the whole frame of the being born under it, a certain disposition to good or evil; and that, consequently, it was necessary only for an astrologer to know the hour and minute of a person's birth to discover his temperament, capacity, and fate; to foretel the diseases to which he would be subject, the death he would die, and even the last day of his existence. This opinion prevailed not only among the ignorant multitude, but among the greatest, the wisest, and the most judicious people of the age; and it is astonishing how long and how firmly they relied on these ideas, though instances could not be wanting of

such predictions proving altogether false. Bishops, dignified clergymen, celebrated philosophers and physicians, gave themselves up to the casting of nativities; and lectures were read in colleges on that subject, as well as upon cabala and the art of divination by punctures and circles. As a proof of what I have advanced, let me here be permitted to say a few words respecting the celebrated Thurneiser, the most brilliant phenomenon of this kind; a man truly singular. He resided in the last century at the electoral court of Berlin, and was physician in ordinary, chemist, nativity-easter, almanaek-maker, printer, and bookseller, all in one person. His reputation in astrology was so great, that scarcely was there a child born in any respectable family in Germany, Poland, Hungary, Denmark, and even England, whose parents did not immediately despatch a messenger to him with an exact account of the moment of its birth. Eight, ten, and twelve such nativities came to him often at one time; and he was at last so oppressed with them, that he was obliged to engage an assistant in his business. Several volumes of such questions are still preserved in the library at Berlin, among which there appear some letters from Queen Elizabeth. Besides, he composed annually an astrological calendar, in which was described not only the nature of the year in general, but also the principal events of it; and the days on which they would take place were distinguished by abbreviations or signs. He, indeed, for the most part, did not give the explanation of them till the year following; but we find instances of his having been prevailed upon by money and fair words to explain them before. It is astonishing what the art of indefinite prophetic diction and the favour of accident can effect. This calendar supported itself above twenty years; had a rapid and extensive sale; and, with other quackeries, procured to the author an estate of 100,000 florins.

But in an art which prescribed such certain and unpassable boundaries to the life of man, how was it possible to find the means of prolonging it? This was done



in the following simple manner: it was supposed that, as every man lay under the influence of a certain star, every other body, plants, animals, and even whole districts and single houses had each its own star by which it was ruled; and that, besides, there was an intimate connexion and sympathy between the planets and the metals. As soon as it was known from what constellation or planet a man's misfortune or sickness proceeded, nothing more was necessary than that he should use such food, drink, and place of residence, as were under the government of an opposite planet. This produced a new regimen, but totally different from that of the Greeks already mentioned. If a day occurred which, on account of its unfavourable constellation, gave reason to apprehend severe sickness or other evils, people retired to a spot which lay under the disposition of a friendly star, or they took such nourishment and medicine as under the protection of a beneficent star would annihilate the influence of the malignant one.\* On the same grounds people hoped for a prolongation of life by talismans and amulets. Because the metals were in intimate connexion with the planets, to wear a talisman of the proper metal, which had been melted, cast, and stamped, under certain constellations, was sufficient to appropriate to oneself the whole power and protection of the planets with which it was connected. People had not only talismans which averted the diseases of one planet, but talismans for all astral diseases; and some even which, by a particular mixture of different metals, and the pecu-

\* About that period, Marsilius Ficinus, in his Treatise on the Prolongation of Life, advised all prudent people to consult an astrologer every seven years, in order that they should be apprized of the dangers which might threaten them during the following seven; and in particular to respect and to use properly the means of the three holy kings—Gold, Frankincense, and Myrrh. M. Pansa, in the year 1470, dedicated to the council at Leipsie, a book *De propagandâ vitâ; Aureus libellus*: in which he strongly advised these gentlemen, above all things, to make known their favourable and unfavourable aspects, and to be on their guard every seven years, because Saturn, a hostile, malignant planet, ruled at those periods.

liar art employed in melting them, acquired the wonderful power of destroying the whole influence of an unlucky nativity; of advancing to offices of dignity, and of rendering the most essential service in regard to commerce or marriage. Was Mars imprinted on a talisman in the sign Scorpio, and had it been east under that constellation, it rendered the person who wore it invincible and invulnerable; and the German soldiers were so prepossessed with this idea, that, as a French writer informs us, after a defeat which they sustained in France, amulets were found hanging from the necks of all the killed and prisoners. The image of the planet-deity must not, however, for the above purpose, have an antique but a mystic and romantic figure and dress. For jovial diseases one had a talisman with the figure of Jupiter, which bore a perfect resemblance to an old professor of Wittenberg or Basle. He was represented like a man with a beard, in a wide gown lined with fur, holding in the one hand an open book, and demonstrating with the right. I should not have dwelt so long on the present subject, had not this conceit of the last century been again revived a few years ago by Cagliostro, and found partisans here and there towards the end of the eighteenth.

The more ridiculous and abstruse these conceptions were, the more respectable must be the memory of a man who could fortunately rise superior to them, and discover the art of prolonging life by pursuing the path of temperance and of nature. Cornaro, who, by the simplest and strictest regimen, and an unexampled perseverance in his plan, attained happily to a great age, which rewarded him richly for his self-denial, and gave an instructive lesson to posterity, was an Italian. One cannot read the history of the life and abstinence of this veteran of eighty-three, and hear how he praises that serenity and contentment for which he was indebted to his mode of living, without participating in his happiness and his cheerful sensations. Till the fortieth year of his age he had led a life of dissipation; had been always subject to cholics, pains in his

limbs, and a fever ; and was so far reduced by the last, that his physicians assured him he could not live above two months ; that all medicine would be useless ; and that the only thing which could be recommended for him was a spare diet. Having followed this advice, he found, after some days, that he was much better ; and at the end of a few years his health was not only perfectly re-established, but he became sounder than ever he had been before. He resolved, therefore, to restrain himself more and more, and to use nothing except what was absolutely necessary for his subsistence. For sixty whole years he took no more than twelve ounces of food, everything included, and thirteen ounces of drink daily. He avoided also violent heat and cold, as well as passion ; and by this uniform regimen he kept not only his body but also his mind in such a state of equality that nothing was able to derange them. When at a great age, he lost an important lawsuit ; and though this disappointment hurried two of his brothers to the grave, he remained perfectly sound and resigned. He was once thrown from a carriage and trod under the feet of the horses, so that an arm and one of his feet were dislocated ; but he caused them to be reduced, and, without the use of any medicine, was soon restored to his former condition. But what is most worthy of remark, and what proves how dangerous the smallest deviation from long custom may be, is what follows. When he was eighty years of age, his friends prevailed upon him, as his body now required more nourishment, to make a little addition to his food. Though well aware that with the general decay of strength the powers of digestion decrease also, and that in old age one ought rather to lessen than increase the quantity of nourishment, he gave way to their request, and raised his food to fourteen and his drink to sixteen ounces. "Scarcely," says he, "had I continued this mode of living ten days, when I began, instead of being cheerful and lively as before, to become uneasy and dejected, a burden to myself and to others. On the

twelfth day I was seized with a pain in my side, which lasted twenty-four hours; and this was followed by a fever, which continued with so much violence for thirty-five days, that my life was despaired of. But, by the blessing of God, and my former regimen, I recovered; and now, in my eighty-third year, I enjoy a happy state both of body and mind. I can mount my horse without assistance; I climb steep hills; and I have lately written a play abounding in innocent wit and humour. When I return home from a private company, or the senate, I find eleven grandchildren, whose education, amusements, and songs, are the delight of my old age. I often sing myself along with them, for my voice is now clearer and stronger than it ever was in my youth; and I am a stranger to those peevish and morose humours which fall so often to the lot of old age." In this happy disposition he attained to his hundredth year; but his example has never been imitated.\*

There was a period when people in France seemed to be so little acquainted with the value of blood, that Louis XIII., in the last ten months of his life, was bled forty-seven times; and besides, he was made to take two hundred and fifteen purgatives, and to use a glyster two hundred and ten times. Soon after, attempts were made, by a process directly contrary, that of filling the veins with fresh youthful blood, to invigorate and prolong the life of man, and to remove incurable disorders. This method was called *transfusion*: and the operation was performed by opening two veins, and, by means of a small pipe, conveying blood from the artery of another living creature into the one vein, whilst the blood was suffered to flow off through the other. Some successful experiments of this kind had been made in England upon animals; and it is certain that some old, lame beasts, sheep, calves, and horses, by filling their bodies with the blood of a young

\* I would earnestly advise people, before they begin this regimen in the strictest sense, to consult their physician; for abstinence carried so far will not be salutary to every one.

animal, had acquired, at least, after some time, sufficient activity and vigour; nay, attempts were even made to inspire courage into timorous animals by the blood of some wild and ferocious one. Encouraged by these experiments, people did not hesitate to try if they could not restore men by the same means. Dr. Denys and M. Emerez, at Paris, were indeed so fortunate as to cure a young man who laboured under a lethargy which had resisted all the power of medicine, and during which he had been bled twenty times, by filling his veins with the blood of a lamb; and likewise a lunatic, by exchanging his blood for that of a calf. But as only the most incurable and wretched of mankind were chosen for these experiments, it soon happened that some of them died during the operation; and since that time no one has ventured to try it.\* It has, however, been practised on animals here, at Jena, with great success: and indeed it ought not to be entirely rejected; for, though the strange blood introduced into our bodies must be soon converted into our own, and much, consequently, cannot be hoped from

\* Transfusion has now become a standard and most important operation, and has been the means of saving many lives. It is applied in cases of extreme loss of blood, wherein every other proceeding but that of the restoration of the lost blood must necessarily fail. The first idea of transfusion dates back to the early part of the seventeenth century, and is mentioned, in 1615, by Andreas Libavius, in a work on the Transmutation of Metals. In England, the operation was performed on animals, by Dr. Lower and Mr. Edmund King, in the year 1666, and later in the same year, after the news of Denys's success, on the human subject. Dr. Denys and M. Emerez were the first to apply transfusion to man, and their first success was very wonderful; the results however proved unsatisfactory, and the operation was prohibited by parliament. Dr. Riva met with a like want of success in Italy, and the operation was prohibited by an edict of the Pope. It was reserved for Dr. Blundell to discover the secret of its failure and revive transfusion in this country; he pointed out the impropriety of conveying the blood of animals into the human system, and was the first to employ human blood for the purpose. By paying attention to this rule, and the invention of suitable apparatus, the operation may now be deemed perfectly safe; a result for which we are indebted to Dr. James Blundell, Dr. Charles Waller, and Mr. Doubleday.—EDITOR.



it in regard to renewing and prolonging life, the sudden and unaccustomed impression made by new blood upon the noblest of the vital organs, may still, in certain disorders, particularly of the mind and nervous system, produce a great and salutary revolution.

The great Bacon, whose genius embraced every branch of science, and who first pointed out to the human mind, which had long wandered amidst error, the path to conduct it back to truth, this great man himself thought the question respecting the prolongation of life worthy of his attention and researches. His ideas on this subject are bold and new. He considers life as a flame, which is continually consumed by the surrounding atmosphere. Every body, even the hardest, is by this incessant evaporation decomposed and destroyed. He thence concludes that, by guarding against this consumption, and by renewing our juices from time to time, life may be prolonged. For preventing external consumption, he recommends in particular the cold bath, and after bathing, that friction with oil and ointments which was so much practised by the ancients. To lessen internal consumption, he prescribes tranquillity of mind, cooling food, with the use of opium and opiates,\* by which the too great vivacity of the internal emotions will be moderated, and the wasting connected with them will be retarded. But, to remedy the unavoidable desiccation and corruption of the juices, the attendant of increasing years, he considers the best method to be to undergo every two or three years a renovating process, which consists in first freeing the body from all the old and corrupted juices, by spare diet and cathartics; and then again filling the dry vessels with new

\* I trust that none of the readers of this book will be tempted to make use of opium or opiates, upon this prescription of Bacon. That philosopher must have reasoned upon the theoretical properties of opiates as sedatives; but practical observation proves them to be stimulants, and consequently means which tend to increase "internal consumption" very powerfully. The habitual use of opium and opiates would certainly have the effect of shortening rather than of lengthening life.—EDITOR.

juices, by means of choice refreshing and nourishing food; and thus, in the properest sense, to renew and invigorate one's self periodically. The truth contained in these ideas cannot be denied; and, with some modification, these precepts might at all times be employed.

At present, men have made more progress in the arts that shorten life than in that of prolonging it. Abundance of quacks have appeared, and still appear, who with astralish salts, gold-tinctures, ethereal essences, celestial beds, and the magic of magnetism, promise to arrest the course of nature. It was, however, soon found that the celebrated *tea of long life*, of the Count de St. Germain, was only a very vulgar mixture of sandal-wood, senna-leaves, and fennel; that the *elixir of life*, so much boasted of by Cagliostro, was merely a simple but very hot stomachic; that the wonderful virtue of magnetism depended on the combined effects of imagination, nervous irritation, and sensibility; and that the vaunted ethereal salts and gold tinctures contributed more to benefit their inventor, than to prolong the lives of those who employed them.

The phenomenon of magnetism deserves in a particular manner not to be omitted in this catalogue. Mesmer, an enthusiastic physician, who becoming a bankrupt had fallen into contempt, and who, in all probability, was not so much assisted by invisible powers as encouraged by negligent magistrates, at length conceived the idea of making artificial magnets, which he sold as a sovereign remedy for many diseases, such as lameness, the gout, toothach, headach, &c. As he found that this plan succeeded, he advanced a step farther, and asserted that he had no more occasion for artificial magnets, but that he himself was the grand magnet which should magnetize the world. His own person, he pretended, was so filled with magnetic virtue, that he could communicate it to another by the touch, by stretching out his finger, and even by a single look. He, indeed, produced instances of people who being touched by him, or even looked at,

declared they had experienced sensations as if they had been struck with a stick, or a piece of iron. This singular virtue he called *animal magnetism*; and he connected with that strange appellation whatever is dearest to man, life, wisdom, and health; which by these means he could dispense and diffuse at his pleasure.

As he was not long permitted to propagate his enthusiasm at Vienna, he removed to Paris; and it was there that he first properly began to exhibit. He had astonishing success; every one wished to be cured by him; and all were desirous of participating in his virtue, and of being able to perform miracles also. He established a secret society, every member of which was obliged to subscribe 100 louis d'ors; and he at length boldly declared that he was the man whom Providence had chosen for the grand business of renovating human nature, so visibly decayed. As a proof of what has been here said, I shall lay before the reader only the following address, which he caused to be made to the public by one of his apostles:—"Behold a discovery which will bring invaluable advantages to mankind, and eternal fame to its author! Behold a general revolution! Other men will inhabit the earth; they will be checked in their career of life by no weakness; and will be acquainted with our evils only by tradition! Mothers will suffer less from the dangers of pregnancy and the pains of childbirth; and they will bring forth stronger children, who will possess the activity, energy, and courage of the old world. Animals and plants, alike susceptible of the magnetic virtue, will be free from diseases; flocks will more easily increase; the productions in our gardens will have more vigour; the trees will produce more beautiful fruit; and the human mind, in possession of this agent, will perhaps present to Nature effects still more wonderful. Who can know how far its influence may extend?"

One might imagine that one here read some of those dreams of the middle ages; but all these pompous promises, and the prospects which they gave rise to, instantly



vanished, when a commission, at the head of which was Dr. Franklin, had closely examined the agency of this magnetism. The veil was withdrawn, and nothing has remained of the whole deception except *animal electricity*, and the conviction that it can be put in activity by handling and stroking the body various ways; but it is certain that, without the help of nervous weakness and enthusiasm, it will never produce these wonderful phenomena, and that it is still less able to prolong the life of man.

It almost appears that mankind wish now to abandon these ideas entirely to quacks, especially as the more enlightened part make amends for the failure of this invention, by having found that length of life does not consist in number of days, but in the use and enjoyment of it.

But as it is impossible that the one can make up for the other, and as at present our acquaintance with the nature of organized life, and the laws to which it is subjected, has been enlarged and carried to greater perfection, it is worth while to employ this improved knowledge in examining a matter of so much importance, and to establish the method of prolonging life in such a manner, on the principles of physics and animal economy, that not only a more definite rule of life may be thence deduced, but also that this object in future may be rendered of no use to quacks and impostors, who, as is well known, can carry on their deceptions within the precincts of science only so long as they are not enlightened by the torch of accurate investigation.

## CHAPTER II.

Inquiry into the nature of the vital power and the duration of life in general. Properties and laws of the vital power. Definition of life. Vital consumption inseparable consequence of vital operation. Term of life. Causes of the duration of life. Retardation of vital consumption. Possibility of prolonging life. Intensive and extensive life. Sleep.

THE first thing necessary in regard to the prolongation of life must undoubtedly be a more intimate acquaintance with the nature of life, and in particular with the vital power, the grand cause of all life.

May it not be possible, therefore, to investigate more accurately the internal nature of that sacred flame, and thence to discover by what it can be nourished, and by what it is weakened? I am perfectly sensible of the boldness of this undertaking. I approach the *sanctum sanctorum* of Nature; and we have too many instances of daring adventurers, who, blinded in such attempts, were obliged to turn back with confusion; and Haller himself, her most intimate confidant, was forced to exclaim:

No mortal being, howe'er keen his eye,  
Can into Nature's deepest secrets pry.

This, however, ought not to deter us. Nature is, at all times, a kind mother; she loves and rewards those who seek for her; and though it may not always be possible for us to reach the perhaps too exalted object of our aim, we may, nevertheless, be certain to find, by the way, so much new and interesting matter as will amply reward us for attempting to approach nearer to her. Let us only beware of forcing ourselves upon her with too rash and precipitate steps; let our minds be unprejudiced and open

to conviction ; let our progress be cautious ; let us ever be attentive to guard against deception and phantoms of the mind ; and let our path, if not the most convenient, be the certain path of experience and of regular proof ; and let us shun the bolder flights of hypothesis, which, in the end, generally prove to the world that the wings which supported them were cemented with wax. In this path we shall, with the greatest certainty, avoid the fate of those philosophers of whom Bacon says, with much justice, "They are night-owls, who see their visions in darkness, but become blind in the light of experience ; and who perceive least that which is clearest." By this path, and with such a disposition of mind, the friends of Nature, since the time of that great man, have approached nearer to her than any one ever did before ; discoveries have been made respecting her most hidden secrets ; and her most concealed powers have been applied to purposes which astonish the present age, and which will still excite the wonder of posterity. By these means it has been possible, through indefatigable research, even without knowing the internal nature of things, to determine and estimate her powers and properties so accurately that we at least have a practical knowledge of them, and can employ them for the uses of life. The mind of man has thus been able to subdue even unknown agents ; to direct them according to pleasure, and render them of utility. The magnetic and the electric power are agents which both elude our senses, and whose nature will, perhaps, remain eternally unsearchable ; yet we have rendered them so serviceable to us, that by the one we can direct our course through the ocean, and with the other kindle our night-lamp while in bed.

I also, perhaps, shall be able to approach nearer to Nature in the present research ; and I flatter myself that the following method of treating my subject will be the most proper to enable me to attain the object I have in view : first, to define more accurately what is meant by life and the vital power, and also to establish their pro-

perties: next, to consult Nature respecting the duration of life in general, and that of different organized bodies in particular; to collect and compare examples; and, from the circumstances and situations in which the life of a created being has a longer or shorter duration, to draw a general conclusion in regard to the most probable causes of the shortness or long duration of existence. After these premises, a more rational and satisfactory answer may be given to the question, Whether and in what manner the life of man can be prolonged?

What is life? and what is the vital power? These questions may be classed among many of the like kind which occur to us during our researches into Nature. They appear simple; relate to the most common phenomena; and are, however, difficult to be answered. Whenever the philosopher uses the word Power, one may always be assured that he labours under a difficulty, since he explains a thing by a word which is itself a problem; for, who has ever yet combined a clear idea with the word Power? In this manner has been introduced into physics an infinite variety of powers: the power of gravity, the power of attraction, the electric power, the magnetic power, which, at bottom, signify nothing more than the letter that expresses the unknown quantity in algebra. We must, however, have expressions for things whose existence is undeniable, though their agency be incomprehensible; and I hope I shall be here permitted to use them, though it is not yet determined whether what I treat of be really matter, or only a property of it.

The vital power is, without dispute, one of the most general, the most incomprehensible, and the most powerful of all the powers of Nature. It fills and gives motion to everything; and, in all probability, is the grand source from which all the other powers of the physical, or at least the organized world proceed. It is that which produces, supports, and renews everything; by it the creation, after so many thousands of years, revives

every spring with the same freshness and beauty as when it first came from the hand of its Maker. It is inexhaustible and infinite, a real eternal emanation of the Deity. In short, it is this which, purified and exalted by a more perfect organization, kindles up the powers of thought and of the soul; and which gives to rational beings, together with life, the sensation and enjoyment of it. For I have remarked, that the sensation of the value and felicity of life is always very nearly proportioned to the greater or less abundance of the vital power; and that, as a certain overflow of it makes one more capable of action and exertion, and of relishing life, nothing is so capable as a want of it to produce that misery and dejection which unfortunately distinguish the present age so much.

By accurate observation of its phenomena in the organized world, the following properties and laws of it may be established:—

1st. The vital power is the most subtle, the most penetrating, and the most invisible agent of Nature, with which we are as yet acquainted. In these respects it exceeds light, electricity, and magnetism, to which, however, it seems to have the closest affinity.

2nd. Though it pervades everything, there are certain modifications of matter to which it appears to have greater relationship than to others. It unites, therefore, with these in greater abundance, as well as in a more intimate manner, and becomes, as it were, peculiar to them. This modification of matter we call organic combination, and structure of component parts; and the bodies which possess them we call organized bodies,—plants and animals. This organic structure seems to consist in a certain disposition of the finest particles, and we here find a remarkable similarity of the vital power to that of magnetism; as the latter, by a stroke given to a piece of iron, in a certain direction, and which alters the internal disposition of the finest component parts, is immediately excited, and may be again destroyed by a contrary derange-



ment. That, at any rate, the organic structure does not lie in the visible tissue or web, may be seen in an egg, in which no traces of organized life can be found, though it is certain that it there exists.

3rd. It can exist both in a free and a fixed state; and in this it has a great resemblance to fire and electricity. As these may reside in a body without manifesting themselves externally until they are called forth by a suitable stimulus, the vital power, in like manner, may long reside in a fixed state, in an organized body, without indicating itself in any other way than by supporting and preserving itself from dissolution. Of this we have some astonishing instances. A grain of corn can retain life in a fixed state for years, and an egg several months: it neither evaporates nor corrupts; and the stimulus of heat alone can disengage the confined power, and call forth the expansive principle of life. Nay, the already expanding organic life can in this manner be again checked and confined, yet exist some time in that state, and preserve the organization intrusted to it, of which the polypes and animal plants in particular afford us the most remarkable instances.

4th. As it seems to have a different affinity to different organized bodies, and abound more in some and less in others, its union with some is likewise stronger, and with others weaker. And it is worthy of remark, that, where it abounds in the greatest quantity and perfection, it seems there to be more loosely combined. To the imperfect, weak-lived polype, for example, it adheres with more force than to a more perfect animal in a higher degree of existence. For the present inquiry this observation is of the utmost importance.

5th. It gives to everybody which it pervades an entirely new character, a specific superiority to other parts of the corporeal world. In the first place, it renders them susceptible of impressions as a stimulus, and makes them capable of reaction; and, secondly, it frees them from the general physical and chemical laws of inanimate nature:

so that one may with propriety say, by the assistance of the vital power a body is transferred from the mechanical and chemical world to a new one, the organic or living world. Here the general physical laws of Nature have place only in part, and with certain limitations. All impressions in a living body are modified and counteracted in a manner different from what they are in an inanimate body. In a living body, therefore, no process merely mechanical or chemical is possible; and everything assumes the character of life. A blow, or any stimulus, cold and heat, act in a living body according to laws altogether peculiar; and in every effect thence produced must be considered as compounded of the external impression and the reaction of the vital power.

In this lie the grounds of the peculiarity of different species, and even of different individuals. We observe daily that plants which grow near each other in the same soil, and which receive the very same nourishment, are widely different in their form, sap, and properties. This is the case also in the animal kingdom; and hence the common expression, "every one has his own peculiar nature."

6th. The vital power is the principal support of the body in which it resides. It not only binds and keeps together the whole organization, but it counteracts also, very strongly, the destructive influence of the other powers of Nature, so far as they depend on chemical laws, which it is able to annihilate, or at least to modify. Among these I reckon, in particular, the effects of *putrefaction*, of the *atmosphere*, and of *frost*. No living being putrefies; a previous weakening or annihilation of the vital power is always necessary in order to render corruption possible. Even in a fixed and inactive state, it is able to keep off corruption. No egg, so long as it contains the vital power; no grain of corn, no silkworm enclosed in its cocoon, no insect apparently dead, corrupts; and it is truly astonishing how it can preserve bodies which have such a strong tendency to putrefaction as that of man has, for sixty,



eighty, or a hundred years. By its binding property it withstands the power of the atmosphere, the second cause of destruction, which, in the end, dissolves the hardest bodies, and makes them fall to pieces. In like manner, the dangerous excitation of the particles of fire keeps off frost. No living body freezes; that is to say, so long as its vital power is in activity, frost cannot destroy it. Amidst the ice mountains of the South and North pole, where all Nature appears to be in a state of torpor, one sees living creatures, and even men, who are not affected by the general congelation.\* This property of the vital power seems not confined merely to its active, but to belong also to its fixed state. An egg, or a grain of corn, possessed of life, freezes much later than one that is dead. The bear passes the whole winter, half torpid, among the snow; the apparently dead swallow and the pupæ of insects continue under the ice without being frozen. When the frost increases so much as to weaken or oppress the vital power, it can then, only, overcome it, and penetrate a living body. This phenomenon depends in particular on that property which the vital power possesses, of exciting warmth; as we shall see hereafter.

7th. A total loss of the vital power is attended with a dissolution of the organized structure of the body which it before filled. The matter of the body obeys the laws and affinities of inanimate chemical nature, to which it now belongs; its first principles are divided and separated; and corruption, under the usual circumstances, follows; which can alone convince us that a body has been totally deprived of the vital power. But it is a great and striking observation, that corruption itself, which seems to annihilate all life, must be the means of calling forth new life

\* The *galanthus nivalis*, snowdrop, pushes itself from the frozen earth through the snow, and its flower remains unhurt, notwithstanding the severe night frosts. Mr. Hunter caused fish to be frozen into water. As long as they lived, the water, though congealed everywhere else, remained around them fluid, and formed a real hole; but as soon as they died, that part froze up also.

again; and that it is properly nothing else than a highly important process to disengage in the speediest manner the component parts, no longer susceptible of life under that form, and to make them fit for new organic combination and life. No sooner is a body thus decomposed than its fine particles begin to be again animated in a thousand small worms, or to display their revival under the figure of beautiful grass: the most vivid flowers recommence, in this manner, the great circle of organic life; and, by a few changes, become a year after component parts perhaps of as perfect a human being as that with which they appeared to corrupt. Their apparent death was only a transition to a new life; and the vital power leaves a body only that it may unite itself again with it in a more perfect manner.

8th. The vital power may be weakened, and even totally destroyed, by certain causes; and by others can be excited, strengthened, and nourished. Among those which destroy it may be reckoned in particular cold, the great enemy of all life. A moderate degree of cold, however, can be so far strengthening, as it concentrates the vital power and prevents its consumption: but this strengthening is negative, not positive; and a higher degree of cold banishes it entirely. In cold, no vital expansion can take place; no egg can be hatched; no grain of corn shoot forth.

To these also belong certain derangements, which seem to have effect partly by annihilating the vital power, and partly by a destructive alteration of the internal organized disposition of the particles. Thus a violent electric shock, or lightning, deprives plants and animals of life, instantaneously, without leaving the least trace of their having injured the organs; and thus among more perfect beings, in particular, may the vital power be destroyed, in a moment, by violent agitations of the mind, such as sudden fear or joy.

Lastly, there are certain physical powers which are highly capable of weakening and even of annihilating it;

and these, therefore, we commonly call poisons: as, for example, the smallpox infection, laurel water, the essential oil of bitter almonds, &c.

But there are agents also of a contrary kind, which have a friendship for, and an affinity to, the vital power; and which are capable of exciting, invigorating, and, in great probability, of affording it a subtle nourishment. These, in particular, are, light, heat, and air, or rather oxygen; three celestial gifts, which, with great propriety, may be called the friends and guardian spirits of life.

LIGHT, the first of these, is, without doubt, the most intimate friend and relation of life; and, in this respect, has certainly a much more essential effect than is commonly believed. The life of every created being is the more perfect the more it enjoys the influence of light. Let a plant or an animal be deprived of light, notwithstanding every nourishment, care, and cultivation, it will first lose its colour, then its strength, and at last entirely decay. Even man, who passes his life in darkness, becomes pale, relaxed, and heavy, and at length loses the whole energy of life; as is proved by the many melancholy instances of persons shut up in gloomy dungeons. Nay, I do not think I say too much when I assert, that organized life is possible only under the influence of light, and in all probability through it; for in the bowels of the earth, in the deepest caverns, where eternal night prevails, nothing is seen but what we call unorganized life. There nothing breathes, there nothing feels; and the only productions which one finds are a few kinds of mould and stone moss, the first most imperfect degree of vegetation. For that reason this vegetation, for the most part, shows itself only on old or rotten wood. The expansion of organized life must, therefore, be here excited by wood and water, or by that putrefaction which generates life, and which in those abysses does not exist.

The second, no less beneficent friend of the vital power, is HEAT, which is alone able to call forth the first movements of life. When winter has reduced all nature to a

deathlike condition, let the genial warmth of the spring atmosphere only breathe upon it, and all its dormant powers are awakened to activity. The nearer we approach the poles everything becomes deader, and we at length find districts where absolutely no plant, insect, or small animal can exist, and where only large masses of being, such as whales, bears, and the like, can retain that warmth necessary for life. In a word, where there is life there is heat, in a greater or less degree; and between both there is a very important and inseparable connexion. Warmth gives life, and life again excites warmth; and it seems difficult to determine which is the cause, and which the effect.

Of the extraordinary power which heat has to nourish and awaken life, the following entirely new and decisive instance deserves to be mentioned. On the 2nd of August, 1790, a carabinier, named Petit, threw himself, entirely naked, into the Rhine, from a window of the military hospital at Strasburg. This circumstance was observed about three o'clock in the afternoon; and the body remained above half an hour in the water before it was drawn out, to all appearance perfectly dead. It was placed in a bed thoroughly warmed, with the head raised up, the arms stretched out close to it on each side, and the legs laid together. No other process was employed than the application of warm cloths to the stomach and legs. Warm stones, also, wrapped up in cloth, were placed in different parts of the bed. In the course of seven or eight minutes a small motion was observed in the eyelids. A little while after, the under jaw, which had been fast locked to the upper one, became loose; the patient foamed at the mouth, and he was able to swallow a few spoonfuls of wine. His pulse now returned, and at the end of an hour he was able to speak. Warmth, in cases of apparent death, acts evidently with as much power as on the first expansion of life: it nourishes the smallest sparks of the vital principle still remaining; fans them, and gradually rouses them into a flame.

The third important nourisher of life is AIR. We find no being that can live entirely without air; and sudden, sometimes instantaneous, death is to most of them the consequence of its being withdrawn. What makes its influence highly visible is, that those animals which breathe are more abundant in the vital power, and possess it in greater perfection, than those which do not breathe. De-phlogisticated or empyreal air appears, principally, to be that component part of our atmosphere which affords the strongest and best nourishment to the vital power; and in the present age, since the wonder-working art of chemistry has taught us to produce it pure, people, on inspiring it, have experienced a general sensation of strengthening and invigoration. The grand principle of this empyreal or vital air is by chemists called *oxygen*; and this component part is that properly which in the air which contains life, and passes into the blood by breathing. Water, also, belongs to the agents friendly to life, so far as it contains oxygen; and it certainly promotes life, for without fluidity no expansion of life is possible.

I think I may with justice, therefore, assert, that light, heat, and oxygen are the real proper nourishment and sustenance of the vital power. Grosser kinds of nourishment, setting aside the quantity of oxygen and empyreal matter which they contain, seem to serve rather for supporting the organs and repairing the consumption. Were not this the case, one could not explain how created beings can maintain life so long without nourishment. Let us only consider the chicken in an egg. It lives without the smallest external support; expands itself, and becomes a perfect animal. A hyacinth, or any other bulbous plant, can, without the least nourishment—except the evaporation of water—expand and shoot forth a stem crowned with beautiful leaves and flowers. Even among more perfect animals we observe phenomena which would otherwise be inexplicable. Dr. George Fordyce, for example, enclosed gold fish in vessels filled with well-water; gave them at first fresh water every twenty-four



hours, but afterwards only every three days; and yet they lived fifteen months without any nourishment, and, what is more wonderful, became twice as big. But, as it might have been believed that the water contained a multitude of invisible nutritive particles, he distilled it; added air to it again; and, to prevent the introduction of insects, closed up the vessels with great care. Notwithstanding all this, the fish lived a long time, increased in size, and had excretions. How is it possible that man himself could endure hunger so long and yet retain life, if the nutriment of the vital power were necessarily derived from the substances by which he is nourished? A French officer, after a tedious and severe illness, was seized with a mental disorder, during which he resolved to starve himself to death; and he continued so firm to his purpose that, for the space of forty-six days he did not take the smallest grain of food. On the fifth day he asked only for some distilled water; and as half a pint of anise-seed water was given to him, he used the whole of it in three days. His friends, however, having represented to him that this quantity was too much, he put into each glass of water that he drank no more than three drops; and in this manner his half-pint lasted till the thirty-ninth day. He then gave over drinking, and for the last eight days took nothing at all. After the thirty-sixth day he was obliged to lie in bed; and it is remarkable that this man, extremely clean in other respects, exhaled during the whole time of his fasting, a very offensive smell, in consequence of the interrupted renovation of his juices, and the corruption attending it; and that his eyes became weak. All advice proved ineffectual, and his friends gave him up as lost, when the voice of Nature was suddenly awakened within him by an accident. He saw a child with a piece of bread-and-butter enter the apartment where he was. This sight excited his appetite so much at once that he begged for some soup. A few spoonfuls of rice broth were now given him every two hours; some stronger food was gradually added; and his health, though slowly, was

in this manner again wholly restored. But it is very singular that while he fasted and was weak, his phrensy and wild imaginations forsook him, and that he answered when addressed by his usual name; but as soon as he had acquired strength by eating, his whole train of incoherent ideas again returned.\*

9th. There is still a cause which tends to weaken and diminish the vital power, and which lies in itself, viz. the loss it sustains by exerting its strength. By every exertion it loses some of its force; and when these exertions are too violent, or continued without intermission, the consequence is that it may be completely exhausted. This is proved by common experience, as we find that, after great exertion in walking, thinking, &c., we become fatigued. It is shown still more clearly by the experiments of Galvani, in which, after death, a muscle and nerves, still alive, may be irritated by the application of metal. If this irritation be often and strongly repeated, the power will be sooner exhausted; but if slowly, it will be exhausted later: and even when it appears to be totally exhausted, one, by intermitting the irritation for some time, can occasion a new accumulation of it, and produce fresh exertions. Hence arises a new means of strengthening, namely *rest*, or a suspension of exertion, by which indeed the power can be accumulated and increased.

10th. The most immediate functions of the vital power are not only to receive impressions, such as irritation, and to react upon them, but also to change into organized nature the component parts which are added to the body; that is, to unite them according to the laws of organization, and also to give them that structure and form which the end of organization requires.

11th. The vital power pervades all the parts of an organized living body, whether fluids or solids; but it manifests itself in different ways, according to the difference of the organs: in the nerves, by sensibility; in the muscles, by irritability, &c. This it does for some time

\* See Hist. de l'Académie Royale des Sciences. An. 1769.



visibly and without interruption, and is what we name generation or *growth*, until the organized body has attained to its destined degree of perfection. This plastic, creative power, does not, however, cease to act; but what was before growth, becomes now constant *renovation*; and this incessant regeneration is one of the most important means which support the being.

These observations on the nature of this wonderful power are sufficient. It will now be easier for us to speak in a more precise manner on the influence which this power has on life; to explain what life properly is; and to say something decisive concerning its duration.

LIFE, in an organized being, means the free active state of the before-mentioned power, and the activity and efficiency of the organs inseparably connected with it. The vital power, therefore, is only capacity; life itself action. Every life, consequently, is a continued operation of the efficiency of the power and of organic exertion. A continual consumption of the power and of the organs is necessarily the immediate consequence of this process; and, on that account, an incessant renovation of both is requisite in order that life may be supported. The process of life may then be considered as a continued process of consumption; and its essence may be defined an uninterrupted wasting and reparation of ourselves. Life has been already often compared to a flame; and indeed the operation in both is the same. Destructive and creative powers are engaged, with never-ceasing activity, in a continual struggle within us; and every moment of our existence is a singular mixture of annihilation and new creation. As long as the vital power retains its freshness and energy, the living plastic powers will have the superiority, and afford it protection in this contest: the body will also increase and approach nearer to perfection. By little and little they will balance each other, and, the consumption becoming equal to the renovation, the body will at length decrease. At last, the vital power being lessened, and the organs worn out, the consumption

will begin to exceed the renovation; and decay, degradation, and, in the end, a total dissolution will unavoidably follow. This is universally the case. Every created being passes through three periods: that of its growth, that of its being stationary, and that of its decline.

The duration of life, in general, depends on the following points:—

1. On the quantity of the vital power which resides in the being. A greater supply of the vital power will naturally last much longer, and be later consumed, than a smaller. Now we know, from what has been before said, that the vital power has a greater affinity to some bodies, and to others a less; that it abounds much more in some than in others; and that many external causes tend to weaken it, and many to nourish it. This, therefore, gives us the first and most important ground of the difference in the duration of life.

2. But, besides the vital power, the organs also are consumed and wasted by living; and, consequently, a total consumption must take place later in a body the organs of which are strong, than in one of a delicate structure more liable to dissolution. Besides, the operation of life itself requires the continual agency of certain organs, which we therefore call the vital organs. If these be diseased, or unfit for use, life cannot continue. A certain firmness of organization, and a proper condition of the vital organs, form the second ground on which the duration of life depends.

3. The process of consumption may be carried on more slowly, or more rapidly; and, consequently, the duration of it, or what we call life, even when the powers and organs are perfectly alike, will be longer or shorter in proportion to the quickness or slowness of the operation; just as a candle lighted at both ends at the same time burns twice as fast as one lighted in the usual manner, or as a light in oxygen gas is consumed ten times faster than one of the same kind in common air, because by that medium the process of consumption is increased and acc-

lerated in a tenfold proportion. This affords the third ground of difference in the duration of life.

4. As renovation of what is lost and continual regeneration are the principal means of counteracting the consumption, those bodies which internally and externally have the best means of regenerating themselves with most ease, and in the greatest perfection, will naturally be of longer duration than those which are destitute of that advantage.

In short, the duration of life in a being will be proportioned to the *innate quantity of vital power*, the greater or less *firmness of its organs*, the speedier or slower *consumption*, and perfect or imperfect *restoration*. All ideas on the prolongation of life, as well as all the means which have been or may be proposed on that subject, can be brought under these four classes, and be examined upon these principles.

From these, several important deductions may be made, and several obscure questions may be answered, of which I shall only mention a few.

Is the *extent of life* determined or not? This question has oft given rise to disputes in which divines and philosophers have been divided, and which have several times brought the medical art into great difficulties. On the above principles, however, it may be easily resolved. Each race of beings, as well as each individual, has its term of life as certainly fixed as it has its defined size, and its proper quantity of vital power, strength of organs, and means of consumption or regeneration; for the duration of life is a consequence of that consumption, and can continue no longer than power and organs are able to support it. But this consumption may be hastened or retarded: favourable or unfavourable, destructive or beneficial circumstances may have an influence upon it; and it thence follows that, notwithstanding the before-mentioned natural determination, the limits of it may be altered.

A general answer may now be given also to the follow-

ing question: Is it possible to prolong life? Undoubtedly it is; but not by magical eures or gold tinctures; nor can we hope to increase the quantity and efficacy of the vital power which has been dispensed to us, or to alter the whole determination of Nature. Whatever is done must be effected by proper attention to the above four points, on which the duration of life properly depends; by strengthening the vital power and the organs; by retarding consumption, and by promoting or facilitating renovation or regeneration. The more food, clothing, manner of living, climate, and even artificial means are favourable to these requisites, the more influence they will have in the prolongation of life; the more they counteract these, the more will they shorten the duration of existence.

What I call retardation of vital consumption, as being, in my opinion, the most important means of prolonging life, deserves here, in a particular manner, to be considered. If we suppose that each body is possessed of a certain quantity of vital power, and certain organs which make as it were our stock of life, and that life consists in a consumption of them, it must be allowed that this stock may be naturally consumed by a stronger exertion of the organs, and by the speedier wasting which is connected with it. He who in a day consumes twice as much of the vital power as another, will exhaust his stock sooner; and organs used with double force will in half the time be worn out and become useless. The energy of life, therefore, will be in an inverse ratio with its duration; or the more intensively a being lives, the more will its life lose in extension. The expression *fast living*, which, as well as the thing itself, is at present so common, is not then altogether improper. One may certainly make the process of vital consumption, whether it consists in labour or enjoyment, more or less rapid, and thus live either fast or slowly. In future I shall distinguish the one by the expression *intensive life*, and the other by that of *extensive life*. This truth is confirmed, not only among men, but also throughout all Nature. The less intensive the life of a being is, the longer

will be its duration. If the intensive life of a plant be increased by heat, manure, and artificial means, it will expand itself to perfection more rapidly, but it will also soon decay. Even a being which naturally possesses an abundant stock of vital power will, when its life is intensively active, be of shorter duration than another less abundant in vital power, but which has by nature a life less intensive. Thus it is certain, for example, that the higher classes of animals have the vital power in far greater quantity and perfection than vegetables; yet a tree lives a hundred times as long as the spirited horse, because the life of the tree is intensively weaker. In this manner, weakening circumstances, when they only lessen the intensive activity of life, may be the means of prolonging it; and, on the other hand, influences which strengthen and excite life, when they increase the internal activity too much, may be prejudicial to its duration. Hence it is evident how very sound health may shorten the duration of life, and a certain kind of weakness be the best means of prolonging it; and that the diet and means used for lengthening life, cannot be altogether those which are commonly called *corroborative*. In this respect, Nature herself gives us the best lesson, as she has connected with the existence of every more perfect being, a certain regulation, which is able to check the stream of its vital consumption, and thereby prevent too rapid wasting. I here allude to sleep, a condition which takes place in every animal of a perfect kind: a disposition of the utmost wisdom, which, in directing and retarding the vital consumption, acts in the same manner as the pendulum of a clock. The time of sleep is nothing else than a suspension of intensive life, or an apparent loss of it; but even in this suspension, this interruption of its activity, lies one of the greatest means of preserving it. A twelve or sixteen hours' uninterrupted continuation of intensive life, causes such an impetuous stream of consumption as produces a more violent pulse, a kind of general fever, the so-called daily evening fever. Sleep then comes to the relief of the body;



reduces it to a more passive condition; and after a seven or eight hours' pause of this kind, the destructive stream of vital consumption is so much checked; what has been lost is so fully renewed, that pulsation and all its other movements are again performed slowly and regularly, and everything proceeds with a peaceful course as before.\* Nothing, therefore, is able to waste and destroy us so speedily as long continued want of sleep. Trees even, those Nestors of the vegetable kingdom, without the annual sleep of winter, would not be able to preserve their lives so long.†

\* Old people, therefore, sleep less, because their intensive life, or vital consumption, is weaker, and requires less restoration.

† In many plants we even find something which may with great propriety be compared to the daily sleep of man. Their leaves every evening are contracted, or droop; their flowers shut themselves up, and their whole external appearance displays a state of rest and repose. Some have ascribed this to the coolness and moisture of the evening; but the same thing takes place also in the greenhouse. Others have considered it as a consequence of darkness; but many shut themselves up in summer at six o'clock in the afternoon. Nay the *tragopogon luteum* shuts itself up so early as nine in the morning; and this plant, therefore, gives us reason to compare it to certain night birds and beasts of the animal world, which are active only during the night, and sleep in the daytime. Every hour of the day even has some plant which then shuts itself up, and on this is founded what is called a *plant-dial*.

## CHAPTER III.

Duration of the life of plants; diversity of it. Annual, biennial, perennial. Experiments respecting circumstances by which this is determined; result of them. Application of the fundamental principles of the duration of life. Great influence of attention and culture on the duration of the life of plants.

IN order to prove and confirm what has been before said, let me now be permitted to take a view of all the classes of the organized world, and endeavour to establish on solid principles what I have asserted. This will give us an opportunity of becoming acquainted with the most important collateral circumstances which have an influence in prolonging or shortening life. How infinitely various is the duration of the different organized beings! Between the mould, which lives only a couple of hours, and the cedar, which can attain to the age of a thousand years, what a difference; how numberless the intermediate degrees; what a variety of life! The grounds, however, of this longer or shorter duration must lie in the structure of each being. This is an important and interesting circumstance, but at the same time of the utmost extent. I must, therefore, content myself with deducing from it the principal data, and exhibiting them in our present point of view.

In this respect, plants, that immense world of creation, that first degree of organized beings which nourish themselves by internal appropriation, form an individual and propagate their race, first present themselves to our view. What infinite variety of shape, organization, size, and duration! According to the latest discoveries and calculations, they amount to forty thousand genera and species at least!



They may all, however, be reduced, according to their duration of life, into three principal classes: annual, or properly only semi-annual, which grow up in spring, and die in autumn; biennial, which die at the end of the second year; and, lastly, perennial, the duration of which extends from four to a thousand years.

All plants of a soft watery constitution, and which have fine tender organs, have a short life, and last only one or at most two years: those alone which have stronger organs and tougher juices exist longer; but wood is absolutely necessary in order to attain to the highest degree of vegetable existence.

Even among those which live only one or two years a remarkable difference may be observed. Those which are of a cold insipid nature, and destitute of smell, live, under like circumstances, not so long as the strong-scented, balsamic plants, which contain more essential oil and spirits. Lettuce, wheat, oats, barley, and all kinds of corn, live no more than a year; but, on the other hand, thyme, mint, hyssop, balm, wormwood, marjoram, sage, &c., can live two years, and even longer.

Shrubs and small trees can live sixty years, and some even twice that number. The vine attains to sixty or a hundred years, and continues fruitful at the greatest age. This is the case also with rosemary. The acanthus and ivy, however, can exceed the age of a hundred. Among many, such, for example, as the different kinds of *rubus*,\* it is difficult to determine the age, as the branches creep along the ground, and always form new plants, so that it is almost impossible to distinguish the new from the old; and by these means they make their existence as it were perennial.

Those which attain to the highest age are the greatest, strongest, and hardest trees; such as the oak, the lime-tree, the beech, the chestnut, the elm, the plane-tree, the cedar, the olive, the palm, the mulberry-tree, and the

\* Common bramble, blackberry, raspberry.

baobab.\* We may with certainty affirm, that some of the cedars of Lebanon, the celebrated chestnut-tree *di centi cavalli* in Sicily, and several of the sacred oaks under which the ancient Germans performed their religious ceremonies, may have attained to the age of a thousand years and more. These are the most venerable, the only now existing testimonies of the ancient world, and inspire us with reverence and awe when the rustling wind plays through their silvery locks, which once served to overshadow the Druids and our wild ancestors clothed in their bearskins.

All trees of a rapid growth, such as the fir, the birch, the horse-chestnut, and the like, yield always less solid and durable wood, and the period of their existence is shorter. The oak, which is the slowest in growing of all, has the hardest wood, and its life is of the longest duration.

Smaller vegetables have, in general, a shorter life than those which are large, tall, and spreading.

Those trees which have the hardest and most durable wood are, however, not always those which live longest. The beech, for example, the cypress, the juniper, the walnut, and the pear-tree, do not live so long as the lime-tree, though its wood be softer.

Those which produce juicy, tender, and delicate fruit, are, in general, shorter-lived than those which are barren, or which bear fruit entirely useless. And among the former, those which bear nuts or acorns become older than those which produce berries and fruit with stones.

Even these short-lived trees, the apple, the pear, the apricot, the peach, the cherry, &c., can, under very favourable circumstances, prolong their life to sixty years; espe-

\* This newly discovered tree (*Adansonia digitata*) seems to be one of those which live to the greatest age. Its trunk acquires the thickness of twenty-five feet in diameter; and Adanson, in the middle of the present century, found trees only six feet in diameter, which had cut on them the names of seafaring people who had visited them in the fifteenth and sixteenth centuries, yet these incisions had become very little extended.

cially when they are freed from the moss which grows upon them.

We may establish it as a general rule, that those trees which are long in producing leaves and fruit, and which also do not soon lose them, become older than those in which both these changes take place speedily. Those, likewise, which are cultivated, have, in general, a shorter existence than those which grow wild; and those which produce sour, harsh fruit, live longer than those which produce sweet.

It is highly worthy of remark, that when the earth is dug up every year around the roots of a tree, it becomes more vigorous and fruitful; but the duration of its life is shortened. On the other hand, if this be done only every five or ten years, it will live the longer. In the like manner, frequent watering and manuring promotes fruitfulness, but it injures the duration of life.

One, also, by frequently lopping off the branches and buds, may contribute very much to the duration of the life of a shrub; so that small, shortlived plants, such as lavender, hyssop, and the like, if annually pruned, may prolong their life to the age of forty years.

It is also to be remarked, that when one turns up the earth, which has remained long untouched and unchanged, around the roots of old trees, and makes it softer and looser, they will produce fresher and more vigorous leaves, and become, as it were, again young.

When we consider with attention these observations, derived from experience, it is perfectly evident how much they confirm the above established principles of life and vital duration, and that they coincide perfectly with these ideas.

Our first grand principle was: the greater the quantity of vital power, and the solidity of the organs, the longer will be the duration of life; and we now find in Nature that the greatest, the most perfect, and the best-formed productions, in which, also, we must allow the greatest

abundance of the vital power, and those which have the strongest and most durable organs, are precisely those which enjoy the longest life; as, for example, the oak and the cedar.

The bulk of the corporeal mass evidently appears here to contribute to the duration of life, and on the three following grounds:—

I. Bulk shows a greater provision of the vital or plastic power.

II. Bulk gives more vital capacity, more surface, more external access.

III. The greater mass a body has, the more time is required before it can be wasted by its external and internal consumptive and destructive powers.

We, however, find that a plant may have very strong and durable organs, and yet not live so long as one the organs of which are of less solidity. Of this we have an instance in the lime-tree, which lives much longer than the beech or the cypress.

This now leads to a law of the utmost importance for organized life and our future research; which is, that, in the organic world, a certain degree only of solidity promotes the duration of life, and that too high a degree of tenacity shortens it. In general, however, and among unorganized beings, it is undoubtedly certain, that the more solid a body is, the greater will be its duration; but in organized beings, where the duration of existence consists in continual activity of the organs and circulation of the juices, this observation is limited, and too great a degree of solidity in the organs, and toughness in the juices, makes them sooner immovable and unfit for discharging their functions, produces obstructions, and brings on premature old age, and even death.

It is not, however, merely on the quantity of the power and the organs that the vital power depends. We have already seen that a great deal, in particular, depends on

the speedier or slower consumption, and on perfect or more imperfect restoration. Is this, therefore, confirmed in the vegetable kingdom?

It is, in the fullest manner; and we here find this general law: the more intensive life a plant has, the stronger and speedier is its internal consumption, the sooner it decays, and the shorter is its duration: on the other hand, the more capacity a plant has, either internally or externally, to regenerate itself, the longer it will preserve its existence.

I shall now proceed to treat, in the first place, on the law of *consumption*. Plants in general have a very weak intensive life, which consists only in the functions of growth, propagation, and receiving nourishment. They are subject to no arbitrary changing of place, no regular circulation, no muscular or nervous motion. The function of generation is, beyond dispute, the highest degree of their internal consumption, the utmost stretch of their intensive life. But how speedily is it followed by decomposition and annihilation! Nature appears here to make, as it were, the greatest exertion of her plastic power, and to show the *ne plus ultra* of the highest finishing and of bringing to perfection.

What tenderness and delicacy in the structure of the flower; what elegance and splendour of colours astonish us often in the most inconsiderable plant, to which we never could have ascribed such expansion. These are, as it were, the dress of ceremony, with which the plant celebrates its greatest festival, but with which it also often exhausts its whole stock of vital power, either for ever, or at least for a long time.

All plants, without exception, lose, immediately after this catastrophe, the vigour of vegetation; and begin to be stationary, which is the commencement of their dissolution. In all annual plants complete death follows; among the larger plants and trees, a temporal death at least, or a torpor of half a year, until, by the great strength of their



regenerating power, they are again put in a condition to shoot forth new leaves and flowers.

On the same principles it may be explained, how all plants which acquire early the power of generation die also soonest: and it is an invariable law for the duration of life in the vegetable kingdom, that the earlier and speedier a plant comes to flower, the shorter time will its life continue; but the later it flowers, its existence will be of the longer duration. All those which flower immediately, the first year, die also the same year; and those which flower for the first time the second year, die also the second. Those trees only, and woody shrubs, which first begin to generate in the sixth, ninth, or twelfth year, become old; and among these, those genera which arrive latest at the period of propagation become likewise the oldest. A highly important observation, which, in part, fully confirms my ideas of consumption, and gives an instructive hint in regard to our future research.

An answer may now be given to that important question, What influence has *cultivation* on the longer or shorter duration of the life of plants?

Culture and art, upon the whole, shorten life; and it may be admitted as a fundamental principle, that in general all wild plants, left to themselves, live longer than those which are cultivated. Every kind of culture, however, does not shorten life; for, by careful attention, a plant which lives only one or two years in the open air, may be preserved much longer: and this is a very remarkable proof, that, even in the vegetable kingdom, it is possible to prolong life by a certain kind of treatment. But the question now is, In what consists the difference of that culture which prolongs life, and that which shortens it? This may be of importance to us in the following research, and may be referred to our first fundamental principle. The more cultivation strengthens intensive life and internal consumption, and at the same time makes the organization more delicate, the more is it prejudicial to

the duration of life. This we observe to be the case in all hothouse plants, which, by warmth, manure, and other arts, are forced to a continual internal activity; so that they produce earlier, oftenre, and more exquisite fruit than is natural for them. The case is the same, when, without forcing, by external causes, a higher degree of perfection and delicacy than belonged to its nature is communicated to the internal organization of a plant, merely by certain operations and arts, such, for example, as ingrafting, propping, and the art used in regard to full flowers. This kind of culture shortens the duration also.

Cultivation, on the other hand, may be the greatest means of prolonging life, if it do not strengthen the intensive life of a plant, or if it retard and moderate in any manner its internal consumption; if it lessen the too great natural toughness or hardness of the organs or matter to such a degree that they continue longer pliable and proper for their functions; and if it keep off destructive influences, and supply it with better means of regeneration. Thus, by the help of culture, a being may attain to a greater extent of life than it could have acquired according to its natural state and destination.

The duration of the life of plants may be prolonged, therefore, in the three following ways:—

1st. If, by often pruning the branches, we guard against too rapid consumption. By these means we deprive the plant of a part of those organs by which it would exhaust too speedily its vital power, and we concentrate the power as it were within it.

2nd. If we thereby check, or at least retard its flowering, and prevent a waste of the power of generation. This, we know, is the highest degree of vital consumption among plants; and we thus doubly contribute to the prolongation of life—first, by preventing this power from being exhausted; and, secondly, by obliging it to return back and to act as a means of support or nourishment.

3rd. If we keep off the destructive influence of frost, the want of nourishment, and an irregular atmosphere,



and preserve it by art, in an uniform, moderate, mean condition. Though we hereby somewhat increase the intensive life, we nevertheless create a richer source of regeneration.

Lastly, the fourth grand point on which the duration of every being, and also of a plant, depends, is its greater or less capacity to *restore* itself and to renew its parts.

In this respect, the vegetable world may be divided into two grand classes. The first do not possess this capacity; and these are the annual plants, or those which live only a year, and which die immediately after they have performed the function of generation.

The second class, on the other hand, which possess this great faculty of regenerating themselves annually; of producing new leaves, branches, and flowers, can attain to the astonishing age of a thousand years and upwards. Such plants may be considered as organized masses of earth, from which an immense number of plants, but perfectly analogous to each mass, spring out every year. And in this regulation the wisdom of Nature appears great and divine.

When we reflect that, as experience teaches us, a period of eight or ten years is required in order to produce that degree of perfection in the organs and in the purification of the juices necessary in a tree before it can bring forth flowers and fruit, if it were subjected to the same laws of decay as other vegetable productions, and if a tree died immediately after it had generated, how ill-rewarded would the culture of it be; and how little proportion would the expense of preparation and time bear to the result! In such a case, fruit indeed would be uncommon.

To guard against this, Nature has wisely established, that the first plant acquires gradually such a consistence and solidity that at last the place of the earth is supplied by the trunk, from which an abundance of new plants spring out every year under the form of buds and buttons.

By this a double advantage is obtained. First, because

these plants spring from a mass of earth already organized, they immediately receive juices assimilated and prepared, and can therefore employ them in the production of flowers and fruit, which with sap derived immediately from the earth would be impossible.

Secondly, these delicate plants, which in reality we may consider as so many annuals, die again after the process of fructification is completed, and yet the vegetable itself, or the stem, continues perennial. Nature, therefore, remains here true to her fundamental law, that the function of generation exhausts the vital power of single individuals, and yet the whole is perennial.

In a word, the result of all these observations is, that the great age of a plant depends on the following points:—

I. It must grow slowly.

II. It must propagate itself slowly, and late.

III. It must have a certain degree of solidity and duration in its organs, a sufficiency of wood, and the sap must not be too watery.

IV. It must be large, and have considerable extension.

V. It must rise into the atmosphere.

By the contrary of all these the duration of life is shortened.

## CHAPTER IV.

Duration of life in the animal world. Observations on plant-animals.

Worms. Insects. Metamorphosis an important means of prolonging life. Amphibia. Fish. Birds. Animals which suckle. Result. Influence of maturity and growth on the duration of life. Perfection or imperfection of organization. Rapid or slow vital consumption. Restoration.

THE animal kingdom, or second grand class of the more perfect part of the organized world, is immensely rich in being, and in variety and diversity of duration. Between the elephant, which attains to the age of a hundred years, and the ephemeron, that small perishable insect, which exists scarcely a day, and which in the twentieth hour of its life is an experienced veteran among its numerous posterity, there are innumerable intermediate degrees of vital capacity and duration; but amidst this vast abundance I shall content myself with collecting only such data as may serve to illustrate our principal question, On what does the duration of life depend?

To begin with worms, the most imperfect class of all, which approach very near to plants; these, on account of their tender, soft nature, can be injured and destroyed with remarkable ease; but, like plants, they have the best support in their extraordinary power of reproduction, by which they can renew whole parts. Nay, when divided into two or three pieces they can still live, and it is consequently difficult to determine their duration.

In this class there are some animals which almost appear to be indestructible, and with which Fontana and Götze made so many important experiments. The former caused wheel-insects and hair-worms to be dried in the hot seorching sun, and to be parched in an oven; and at

the end of half a year he was able to revive these dried animals by pouring over them a little lukewarm water.

These experiments confirm our position that the more imperfect the organization, the stronger is the life. The case here is the same as in the seeds of plants ; and one may say that these first points of the animal creation are, in a certain measure, only the first shoots or seeds for the more perfect animal world.

Among those insects which have more of the animal, and a more finished organization, the power of reproduction cannot perform such wonders. But Nature here has fallen upon another wise establishment, which evidently prolongs their existence ; I mean that of metamorphosis or transformation. The insect exists, perhaps two, three, or four years, as a larva or worm ; it then becomes a pupa or nymph, and exists again in that deathlike state a considerable time, at the end of which it appears a completely finished being. It now first has eyes, a winged, often an elegant body ; and what stamps it principally with the mark of perfection, it is now first rendered fit for generation. This state, which may be called the time of its bloom, is, however, the shortest ; it soon dies ; for it has attained to the end of its destination.

I cannot here omit to remark, how much these phenomena coincide with the principles I laid down as the grounds on which the duration of life depends. In its first state as a worm, how imperfect its existence, and how little its motion ! It is impossible for it to generate, and its whole faculties seem to consist in those of eating and digesting ; for some caterpillars have so monstrous an appetite, that, in the course of twenty-four hours, they devour more than three times the weight of their bodies. Their self-consumption, then, must be exceedingly small, and their restoration prodigious. It need excite no surprise, therefore, that, in this condition, notwithstanding their diminutive size and imperfection, they can live so long. The ease is the same in regard to their intermediate state as a chrysalis, when the animal lives

without nourishment, and is consumed neither externally nor internally. But in the last period of its existence, of its completely formed state as a winged ethereal being, its whole life seems to consist in continual motion and removal from one place to another; yet, though its self-consumption is incessant, we cannot think of nourishment or restoration, for many butterflies in this condition have no mouth. With such a refinement of organization, such a disproportion between what is added and what is taken away, no duration is possible; and it is confirmed by experience that the animal soon dies. Here, therefore, the same being exhibits to us, in a very evident manner, a picture of the most perfect as well as most imperfect life, and of the longer or shorter duration connected with them.

Amphibia, those cold transition beings, can prolong their existence to an extraordinary length; an advantage for which they are principally indebted to the tenacity of their life, that is, to the very intimate and difficult to be dissolved connexion of the vital power with the material part, and the weakness of their intensive life.

Of the tenacity of life we have instances truly astonishing. Tortoises have been seen to live a considerable time without the head; and frogs, when their hearts were torn out, have still continued to leap about. A tortoise has existed six whole weeks without any food; and this sufficiently shows how small its intensive life is, and how little need it has of restoration. Nay, it is proved that toads have been found alive enclosed in stones and blocks of marble.\* Whether they were shut up there in the egg,

\* In the year 1733, a toad was found in Sweden, seven ells deep, in a quarry, in the middle of a block of the hardest stone, to which people were obliged to force their way, with much labour, by means of chisels and the hammer. It was still alive, but exceedingly weak. Its skin was shrivelled, and covered here and there with a stony crust. See *Transactions of the Swedish Academy*, vol. iii. p. 285. It is most probable that the toad, when very young, had got into a small cleft of the stone, where it nourished itself with moisture and the insects which crept into it; that the cleft was at length closed up by sparry matter, and that the animal, by the time it grew up, was thus completely incruled.



or as perfect beings, both cases are equally astonishing; for what a number of years must have been necessary for the marble to generate, and before it could acquire its solidity!

This shows how much influence the power of regeneration has in prolonging life. A great many dangers and causes of death are thereby rendered harmless; and whole parts which have been lost are again renewed. To this belongs that phenomenon of the skin which we find among most animals of this class. Snakes, frogs, lizards, &c., cast their skin every year; and it appears that this method of becoming again young, contributes very much to their support and duration. Something of the like kind seems to prevail throughout the whole animal world: birds change their feathers as well as their bills, which is called moulting; insects transform themselves, and most quadrupeds change their hair and their claws.

The tortoise and crocodile, attain to the highest age, as far as we have yet been able to learn from observation.

The tortoise, an indolent, slow in all its motions, and phlegmatic animal, and which is so long in growing that in twenty years one can scarcely observe an increase of a few inches, lives to the age of a hundred years and more.

The crocodile, a large, strong, vigorous animal, enclosed in a hard coat of mail, incredibly voracious, and endowed with extraordinary powers of digestion, lives also very long; and, according to the affirmation of several travellers, is the only animal which grows as long as it exists.

It is astonishing what instances of great age may be found among fishes, the cold-blooded inhabitants of the waters. We know from the ancient Roman history, that in the imperial fish-ponds there were several lampreys (*murænæ*) which had attained to their sixtieth year; and which had, at length, become so well acquainted and familiar with man that *Crassus orator unam ex illis defleverit*.\*

\* That Crassus the orator shed tears for one of them when it died.



The pike, a dry, exceedingly voracious animal, and carp also, according to undeniable testimony, prolong their life to a hundred and fifty years. The salmon grows rapidly, and dies soon. On the other hand, the perch, the growth of which is slower, preserves its existence longer.

It appears here worthy of being remarked, that natural death occurs more rarely among fishes than in any other part of the animal kingdom. The law of the transition of one into another, according to the right of the strongest, prevails here far more generally. One devours another, the stronger the weaker; and one may assert that death exists less in the water, as the dying pass immediately into the substance of another living being, and consequently the intermediate state of death is less common than on land. Putrefaction takes place in the stomach of the stronger. This regulation is a proof of exalted and divine wisdom. If the innumerable millions of the inhabitants of the waters which die daily, remained only one day un-entombed, or, what is the same thing, not devoured, they would speedily diffuse abroad the most dreadful pestilential evaporation. In water, where vegetation, that great means of correcting animal putrefaction, exists in less extent, every cause of corruption must be guarded against; and on this account continual life must prevail.

Among birds, also, there are several species which live a long time; and to this, without doubt, the following circumstances contribute:—

1st. Birds are remarkably well clothed; for no covering can be more perfect or better calculated to preserve warmth than feathers.

2nd. They have, every year, a kind of reproduction, or renovation, which is called moulting. During that period, the bird appears to be somewhat sick; casts, at length, its old feathers, and acquires new ones. Many cast their bills also; an important part of renovation, as they are thereby put in a condition to feed themselves much better.

3rd. Birds enjoy the purest air, and in the greatest quantity.

4th. They are exposed to much motion; but their motion is the most healthful of all, as it consists of both active and passive; that is to say, they are suspended, and exert themselves only in moving forwards.

The golden eagle, a large strong animal with solid vessels, attains to a very great age. There have been instances of many living in menageries, above a hundred years.

The case is the same with the vulture and falcon, both carnivorous animals. A gentleman at London, a few years ago, received from the Cape of Good Hope one that had been caught with a golden collar, on which was inscribed in English, "His Majesty K. James of England, An. 1610." It had, therefore, been at liberty 182 years from the time of its escape. How old was it when it escaped? It was of the largest species of these birds, and possessed still no little strength and spirit; but it was remarked that its eyes were blind and dim, and that the feathers of its neck had become white.

The crow, a carnivorous bird with hard black flesh, can extend its life also to a hundred years; as can likewise the swan, an animal exceedingly well feathered, which feeds upon fish, and is fond of running water.

The parrot, in this respect, distinguishes itself in a particular manner. One has had instances of its living sixty years a prisoner with man, and how old may it not have been when it was caught? It is an animal which eats and digests almost all kinds of food, which changes its bill, and which has hard, dark-coloured flesh.

The peacock lives to the twentieth year. On the other hand, the cock, a hot, quarrelsome animal, does not exist nearly so long. Of a still shorter life is the sparrow. Small birds also live in general shorter. The blackbird and goldfinch live, at most, only to the twentieth year.

If we now turn our view towards the most perfect animals, the *mammalia*, those which approach nearest to

man, we shall find amongst these also a very striking difference of age.

That which attains to the greatest is perhaps the elephant; which, by its size, slow growth (for it grows to the thirtieth year), exceedingly hard skin and teeth, has the justest claim to longevity.

The age of the lion cannot be accurately determined; but we have reason to think that it is of considerable extent; because some have been found without any teeth.

The bear, though a great sleeper, and remarkably phlegmatic when awake, has, however, no great duration of existence. A poor comfort for those who imagine that they have found in indolence the secret for prolonging life.

The camel, on the other hand, a meagre, dry, active, exceedingly hardy animal, becomes old. It generally attains to the age of fifty, and sometimes of a hundred years.

The horse does not live more than about forty years. He is a large, strong animal, but not well covered with hair; he is therefore of greater sensibility. He may, however, ascribe his short life, in some measure, to the severity of man; for we do not yet know by experience how long he can live in a state of nature. The life of the ass has about the same duration. The mule, a production of both, is stronger lived, and becomes older.

What has been said respecting the great age of the stag is a fable. It lives thirty years, and perhaps a little over.

The bull, large and strong as he is, lives only a short period—about fifteen years, or at most twenty. Most of the smaller animals, such as sheep, goats, the fox, the hare, &c., live no more than seven or ten years; except dogs and swine, which can reach the age of fifteen or twenty.

From this variety of observations the following result may be drawn:—

The animal world have far more external and internal

movement, a more perfect and a more compounded intensive life, and, without doubt, more self-consumption than the vegetable. Besides, the organs of this kingdom are much tenderer, more complex, and more highly finished. Animals, therefore, must have a shorter life than plants. But for this reason they possess a greater abundance of the vital power; have more points of contact with the whole of Nature that surrounds them, and consequently more accession and restoration from without. It must nevertheless be difficult, in this class, to attain to a remarkably great age; but a short life, also, will occur very rarely. And this is what we find from observation; a mean age of between five and forty years is the most common.

The sooner an animal is formed, the more rapidly it arrives at perfection; but the sooner it will decline and lose its existence. This seems to be one of the most general laws of Nature, and is confirmed throughout all classes. Only one must not confound expansion with growth, and reckon by the latter; for there are animals which grow as long as they live, and to which growth forms part of their nourishment: but this law must be referred, in particular, to the two following periods:—

1. To the time of the first expansion in the egg, either in or out of the body.

2. To the period of maturity, which one may consider as the utmost boundary of physical conformation, and as a proof that the being has now attained the highest degree of finishing which it was physically capable of receiving.

The rule, therefore, must be thus expressed: the less time an animal requires for its formation in the mother's womb, or the egg, the sooner it will perish. The elephant, which goes with young till the third year, lives also longest; but the hind, the cow, the dog, which go with young only from two to nine months, have a much shorter existence. *Quod citò fit, citò perit.\**

\* That which is quickly formed, quickly perishes.

Another law of great importance must also not be omitted; the sooner a being attains maturity, the sooner it propagates; but the shorter will be the time of its duration. This law, which we find so perfectly confirmed in the vegetable kingdom, prevails likewise, without exception, in the animal. The greatest instance of it is afforded by insects. Their first period towards maturity, that is, their state as larvæ, may continue very long, even several years; but as soon as they have undergone their grand transformation, that is, have attained maturity, their existence is completely ended. And among quadrupeds, it is certain that we may determine the life of an animal with considerable precision, if we consider the epoch of maturity as the fifth part of the whole duration of its existence.

The horse, ass, and bull, are at maturity in the third or fourth year, and live from fifteen years to twenty. Sheep come to maturity the second year, and live from eight to ten years.

All horned animals, in general, live shorter than those which have not horns.

Animals with dark-coloured black flesh are, on the whole, longer-lived than those which have white flesh.

And all quiet, timid animals, have a shorter existence than those of a contrary temperament.

A certain covering of the body seems, in a particular manner, to have a great influence on the duration of life. Thus birds, which undoubtedly have the best and most durable covering, live exceedingly long; as do also the elephant, the rhinoceros, and the crocodile, which have the strongest skin.

The nature of their motion has its influence also. Running seems to be the least favourable to duration of life; while, on the other hand, swimming, flying, and, in short, that motion which is compounded of the active and the passive, seems to be the most favourable.

This principle, therefore, is confirmed: the *more intensive* the life of a being is, and the *less its internal con-*



*sumption*, that is to say, according to the common mode of expression, the more imperfect the life of a being is, it will be so much the more lasting. On the other hand, the tenderer, finer, and more complex the organization, and the more perfect the life is, it will be of so much the less duration.

This is shown, in the clearest manner, by the following observations :—

1st. Zoophytes, or plant animals, whose whole organization consists in a mouth, a stomach, and a straight gut, have a life exceedingly tenacious and difficult to be destroyed.

2nd. All cold-blooded animals have, in general, a stronger and longer life than the warm-blooded ; or, what amounts to the same thing, those which do not breathe have in this an advantage over those which breathe. And for what reason ? Breathing is the source of internal heat, and accelerates consumption. The business of respiration increases, upon the whole, the perfection of a being ; but it increases also its consumption. An animal which breathes has as it were a double circulation, the common and the less through the lungs ; besides a double surface, which comes into continual contact with the atmosphere, the skin and the superficies of the lungs ; lastly, a far stronger irritability, and consequently a much greater self-consumption both internally and externally.

3rd. Animals which inhabit the water live longer, in general, than those that reside in the air ; and for this reason, because an animal in water evaporates very little, and because water does not consume nearly so much as the atmosphere.

4th. Lastly, the strongest proof what an astonishing effect lessening the external consumption has in the prolongation of life, is afforded by instances where that consumption has been rendered totally impossible. I mean those of toads enclosed in blocks of stone, where, by the external consumption being suspended, they preserved their life so much the longer. In that state nothing could



evaporate, nothing could be dissolved; for the small quantity of air which was perhaps shut up with them, must have soon become so much saturated as to be incapable of receiving anything more. On this account the animal could exist so long without nourishment; for the need of nourishment arises from the loss which we sustain by evaporation and consumption. In such a state, where everything remains as it was, no reparation is required. By such means the vital power and organization might be retained perhaps a hundred times longer than in the natural condition.

The last principle on which the duration of life is founded, more perfect restoration, is fully confirmed likewise in this kingdom of Nature.

The highest degree of restoration is the *reproduction of entirely new organs*.

This power is found, in a wonderful degree, in the class of plant-animals, worms and amphibia, in short of those animals which have cold blood and no bones, or only such as are cartilaginous. And amongst all these animals there exists a most remarkable duration of life.

Somewhat of the same nature is the casting of scales among fishes; of the skin among snakes, crocodiles, frogs, &c.; of the feathers and bill among birds: and we always observe, that the more perfect this renovation is, the duration of life is proportionably longer.

A highly important circumstance, however, in regard to restoration, is nourishment; and here a most essential difference is manifested between the vegetable and animal world. All plants derive their nourishment from without: on the other hand, it is an invariable law of Nature, among animals, that the nourishment must first pass into a cavity or bag, commonly called the stomach, destined for that purpose, before it can be received into the mass of the juices and become a part of the animal; and the imperfect polype, as well as the elephant, has these characteristics of the animal, a *mouth*, and a *stomach*.

It is this which forms the grand basis of the animal

world; the characterizing difference between animals and plants; and upon which is originally grounded the superior advantage of individuality; of internal, more perfect, and more expanded life. Among animals, the substance which is received may obtain a far higher degree of preparation than among plants; the roots (the lacteal vessels) are, as it were, within; and receive the nourishing juices, already assimilated and purified, through the intestines. Animals, therefore, are subject to more secretions and excretions than plants; and, for the same reason, the course of the nourishing juices and of all movements proceeds, among animals, from the internal to the external part, and among plants from the external to the internal. For this reason, also, the progress of death, in an animal, is from the external to the internal parts: in a plant the case is reversed; and one may often see trees without pith or internal substance, of which nothing exists but the bark, and which, however, still continue to live. For the above reason, likewise, animals can receive nourishment far more various, and restore themselves in a much more perfect manner, and, by these means, counter-balance the stronger self-consumption.

## CHAPTER V.

Duration of the life of man. Apparently incredible age of the patriarchs explained. Age of the world has no influence on the duration of human life. Instances of great age among the Jews, Grecks, and Romans. Tables of the Census under Vespasian. Instances of great age among kings, emperors, and popes. Frederick II. Among hermits and monks; philosophers and men of letters; poets and artists. Instances of the greatest age to be found only among country people, hunters, gardeners, soldiers, and sailors. Few to be found among physicians. Shortest life. Difference of age according to the climate.

LET us now proceed to the grand source of our information, the history of man; and let me there collect examples which may be of utility to the present research.

I shall, therefore, lay before my readers the most remarkable instances of the greatest age among mankind; and we shall thence see in what climate, under what favourable circumstances, in what condition, and what state both of mind and body man has attained to the highest degree of longevity: an agreeable review, which will make known to us a peculiar part of the history of the world, the history of the age of man, and the venerable gallery of the Nestors of ancient periods and nations. I shall occasionally add a few short characteristics, to give at the same time a hint how far character and temperament have an influence on the duration of life.

It is commonly believed that, during the early periods of the world, the lives of its inhabitants were more youthful and more perfect; that these primitive men had a gigantic size, incredible strength, and a most astonishing duration of life. A variety of such notions were long prevalent among mankind; and to these we are indebted

for the origin of many romantic tales. Some have not hesitated seriously to ascribe to our forefather Adam, the height of nine hundred yards, and the age of almost a thousand years. But the accurate and rational investigation of modern philosophy has converted the supposed bones of giants, found in different parts of the earth, into those of the elephant and rhinoceros; and acute theologians have shown that the chronology of the early ages was not the same as that used at present. Some, particularly Hensler, have proved, with the highest probability, that the year till the time of Abraham consisted only of three months; that it was afterwards extended to eight; and that it was not till the time of Joseph that it was made to consist of twelve. These assertions are, in a certain degree, confirmed by some of the eastern nations, who still reckon only three months to the year; and besides, it would be altogether inexplicable why the life of man should have been shortened one half immediately after the flood. It would be equally inexplicable why the patriarchs did not marry till their sixtieth, seventieth, and even hundredth year; but this difficulty vanishes when we reckon these ages according to the before-mentioned standard, which will give the twentieth or thirtieth year; and consequently, the same periods at which people marry at present. The whole, therefore, according to this explanation, assumes a different appearance. The sixteen hundred years before the flood will become four hundred and fourteen; and the nine hundred years (the highest recorded) which Methuselah lived, will be reduced to two hundred—an age which is not impossible, and to which some men in modern times have nearly approached.

In profane history, also, we have an account of many heroes and Areadian kings of those periods who attained to the age of several hundred years; but these pretended instances of longevity can be explained in the same manner.

With the period of Abraham, a period when history seems first to be established on more certain grounds, we

find mention of a duration of life which can be still attained, and which no longer appears extraordinary, especially when we consider the temperate manner in which the patriarchs lived; and that, as they were nomades or a wandering people, they were much exposed to the free open air.

From the history of the Jews we are enabled to collect the following facts. Abraham, a man of great and resolute mind, who was fortunate in all his undertakings, attained to the age of 175 years; his son Isaac, a chaste, peaceable man, and fond of tranquillity, to 180; Jacob, who was also a lover of peace, but crafty and cunning, lived only 147; Ishmael, a warrior, 137; Sarah, the only female of the ancient world with whose duration of life we are acquainted, lived 127 years; Joseph, a man of great prudence and political talents, much afflicted in his youth, but greatly honoured in his latter days, lived to the age of 110.

Moses, a man of extraordinary strength and spirit, rich in deeds but weak in words, carried his life, during which he was exposed to great care and fatigue, to the age of 120. But he even complains that the life of man endures only threescore and ten, or at most fourscore years; and we hence find that, in regard to age, the case was exactly the same three thousand years ago as it is at present.

The warlike and ever active Joshua lived to the age of 110. Eli, the high priest, a corpulent, phlegmatic man, of a resigned disposition, lived to be only 90; but Elisha, severe towards others and towards himself, who despised convenience and riches, lived far above 100. In the latter period of the Jewish state, the prophet Simeon, a man full of hope and confidence in God, was distinguished by a life of 90 years.

However replete with fables the history of the Egyptians may be, the age of their kings, recorded from the earliest periods, presents nothing remarkable. The longest reign is somewhat above fifty years.



If we judge according to the account of Lucian, we must form a very high idea of the great age of the Seres, or the ancient Chinese. They are expressly called *Macrobi*; and Lucian ascribes their longevity to their drinking water in great abundance. Is it not probable that they may, even then, have been acquainted with tea?

Among the Greeks we find several instances of great age. The wise Solon, a man of much magnanimity, depth of thought and ardent patriotism, though not indifferent in regard to the enjoyments of life, attained the age of 80.

Epimenides of Crete is said to have lived 157 years. The poet Anacreon, so fond of mirth and jollity, lived to the age of 80; as did also Sophocles and Pindar. Gorgias of Leontium, a great orator, a man who had travelled much, and who spent a great deal of his time in the company of young people and in giving them instruction, prolonged his life to the age of 108 years. Protagoras of Abdera, an orator and traveller also, lived 90; and Isocrates, a man of great temperance and modesty, lived 98. Democritus, the friend and searcher of Nature, a man also of a good temper and serene mind, lived 109 years; and the frugal, but slovenly Diogenes, 90. Zeno, the founder of the Stoical sect, and a master in the art of self-denial, attained nearly to the age of 100 years; and Plato, one of the most divine geniuses that ever existed, and a friend to rest and calm meditation, to that of 81. Pythagoras, who in his doctrine recommended good regimen, moderation of the passions, and the gymnastic exercises, became also very old. He used to divide the life of man into four equal parts. From the first to the twentieth year he called him a child, a man begun; from the twentieth to the fortieth, a young man; from the fortieth to the sixtieth, a man; from the sixtieth to the eightieth, an old or declining man; and after this period he reckoned him no more among the living, let him live to whatever age he might.

Among the Romans the following instances deserve to be remarked:—



M. Valerius Corvinus, a man of great boldness and courage, extremely popular, and always fortunate, was above the age of 100. Orbilius, the celebrated Orbilius, first a soldier and then a pedagogue, but who always exercised military severity, attained, in this kind of life, to the age of above 100 years. How far Hermippus, the instructor of young maids, carried his life, we have seen before. Fabius, well known on account of his delay, showed, by an age of 90 years, that something may be gained even from death by the same means. And Cato, that man with an iron body and iron mind, fond of a country life, and an enemy to physicians, lived to the age of above 90.

We have likewise remarkable instances of the longevity of Roman ladies. Terentia, the wife of Cicero, notwithstanding her many misfortunes, eares, and the gout, with which she was tormented, lived to the age of 103. And Livia, the wife of Augustus, an imperious, passionate, but fortunate woman, attained to that of 90.

It is particularly worthy of remark, that several instances occur of Roman actresses who became old; an advantage which they have now unfortunately lost, and which seems to show that more vital consumption is connected with their occupation at present than formerly. One Luceja, who came on the stage very young, performed a whole century, and even made her appearance publicly when in her 112th year. Galeria Copiola, an actress, and dancer also, was 90 years old when she first performed in the theatre; and she was again brought forward as a wonder, in order to compliment Pompey. But this even was not the last time of her acting; for she appeared once more, to show her respect for Augustus.

A very valuable collection in regard to the duration of life in the time of the emperor Vespasian, has been preserved to us by Pliny, from the records of the Census, a source perfectly sure and worthy of credit. It there appears, that in the year when that numbering of the people took place, the seventy-sixth of our era, there were

living in that part of Italy which lies between the Apennines and the Po, only 124 men who had attained the age of 100 years and upwards,—viz., fifty-four of 100, fifty-seven of 110; two of 125; four of 130; four of from 135 to 137, and three of 140. Besides these, there were in Parma five men, three of whom were 120, and two 130; in Placentia, one of 130; at Faventia, a woman of 132; and in Vellejadium, a small town near Placentia, there lived ten persons, six of whom had attained to the age of 110, and four to that of 120.

The bills of mortality also of the celebrated Ulpian agree in a most striking manner with ours, and in particular with those of great cities. From these it appears that one might with great propriety compare Rome to London, in regard to the probability of the duration of life.

We have sufficient reason, therefore, to believe that the duration of life in the time of Moses, the Greeks, and the Romans, was invariably the same as at present; and that the age of the earth has no influence on the longevity of its inhabitants, that difference excepted which may be produced by the cultivation of its surface, and the difference of climate that may thence arise.

Thus, for example, it is certain that in Italy, at present, neither so many nor so old people are to be found as in the time of Vespasian; but the reason is, that the climate then, on account of the woods and forests, was much colder,\* and rendered the men more robust. It is also not improbable that the natural warmth of the earth itself may alter, and be accumulated sometimes in one region and diminished in another.

The result of this research will therefore be, that man can still attain to the same age as ever. The difference only is, that more attained to old age formerly than at present.

Let us now take a view of the different states and con-

\* Of this we have several instances. Pliny, for example, speaks of winters when the wine was congealed in the cellars, and the Tyber frozen to the bottom.

ditions of men, and, in this respect, turn our eyes in particular to modern times.

To begin with emperors, kings, and, in short, the great ones of the earth: has Nature, which has conferred upon them, in the highest degree, all the advantages and enjoyments of this world, bestowed upon them also her best gift, a longer duration of life? Unfortunately not. Neither ancient nor modern history informs us that this prerogative belongs exclusively to them. In ancient history we find only a few kings who attained to their eightieth year; and this is equally the case in the modern. In the whole catalogue of Roman and German emperors, reckoning from Augustus to the present time, which includes altogether above two hundred, we find (the two first, Augustus and Tiberius, excepted) only four who arrived at the age of 80; viz., Gordian, Valerian, Anastasius, and Justinian.

Augustus, a man of a peaceful, moderate disposition, though quick and lively in action, temperate in the enjoyments of the table, but more susceptible therefore of the pleasure arising from the arts and the sciences, attained to the age of seventy-six. He used none but the simplest food; ate only when he had an appetite; never drank above a pint of wine; and considered mirth and good company as the best seasoning of his meals. He possessed a serene mind, was a great favourite of fortune, and entertained such ideas respecting the term of life, that he said to his friends a little before his death, *Plaudite, amici!* "Applaud, my friends; the farce is ended!" a disposition of mind exceedingly favourable to longevity. In the thirtieth year of his age he was attacked by so severe and dangerous a disease that his life was despaired of. It was a sort of nervous disorder, which, by the warmth and hot baths recommended to him by his ordinary physicians, must have been rendered still worse. Antonius Musa resolved to treat his case in a manner totally different. He obliged him to keep himself perfectly cool, and to use the cold bath; and by these means his health was again soon

restored. This disorder, as well as the useful change which it effected in his mode of living, contributed very much, in all probability, to the prolongation of his life.

From this account we learn also, that the method by the cold bath is improperly called the English method, since it appears to be of so great antiquity.

The emperor Tiberius lived two years longer. He was of a violent temper, but *vir lentis maxillis*,\* as Augustus called him; a friend to voluptuousness, though still attached to regimen, and, even amidst enjoyment, not inattentive to his health; so that he used to say he considered a man as a fool, who, after the thirtieth year of his age, consulted physicians respecting diet; because every one, with the least attention, must before that period have discovered what was useful and what prejudicial to him.

Aurengzeb, that celebrated conqueror, attained to the age of 100; but he is not to be considered so much a king as a nomade or wanderer.

Great age is equally uncommon in the royal and princely families of modern times. We must, however, except the kings of France, of the house of Bourbon, two of whom, who succeeded each other, attained the age of 70.

Frederick II., that great prince, one of the most important instances in modern times, must not be here omitted. He was great in everything, even in what related to his medicine. He not only attained to an age very rare among kings—that of 76, but, what is still of greater weight, attained to it amidst a life more exposed to care, labour, and fatigue, than that perhaps of any other man who ever existed, as he spent twenty years of it in active war, during which he submitted to all the toils of a common soldier; but with this difference, that, as commander-in-chief he thought for all, and frequently passed the night, while others were enjoying repose, in

\* Literally: "A man of slow jaws," which may mean that he masticated slowly, as well as that he was moderate in the quantity of his food.—EDITOR.

the deepest meditation, and in forming new plans for his future operations.

The ecclesiastical princes, in this respect, have not been more fortunate. Of three hundred popes, who may be reckoned up, no more than five attained to or exceeded the age of eighty, though they possessed the advantage of obtaining the pontifical chair at a late period, and had therefore a greater probability of enjoying longevity.

An extraordinary number of instances, however, may be found among the hermits and monks, who, with the strictest regimen, self-denial, and abstraction, while they divested themselves of all human passions, and avoided such intercourse as might tend to excite them, led a life of contemplation, but united with bodily exercise and the enjoyment of free air. Thus the apostle John attained to the age of 93; Paul the hermit, by means of an almost incredibly severe regimen in a grotto, to that of 113; and St. Anthony to that of 105. Athanasius and Jerome also exceeded the age of 80.\* In modern times, since mental abstraction, self-denial, and temperance have undergone some variations, instances of this kind are become more uncommon.

Deep-thinking philosophers have at all times been distinguished by their great age, especially when their philosophy was occupied in the study of Nature, and afforded them the divine pleasure of discovering new and important truths: the purest enjoyment, a beneficial exaltation of ourselves, and a kind of restoration which may be ranked among the principal means of prolonging the life of a perfect being. The most ancient instances are to be found among the Stoics and the Pythagoreans, according to whose ideas subduing the passions and sensibility, with the observation of strict regimen, were the most essential duties of a philosopher. We have already considered the example of a Plato and an Isocrates. Apollonius of Tyana, an accomplished man, endowed with extraordinary powers

\* St. David lived to the age of 146; Theodore, Archbishop of Canterbury, to that of 88; and Wilfred, Bishop of Hexham, through a turbulent career, to 76.—EDITOR.



both of body and mind, who, by the Christians, was considered as a magician, and by the Greeks and Romans as a messenger of the gods, in his regimen a follower of Pythagoras, and a friend to travelling, was above 100 years of age. Xenophilus, a Pythagorean also, lived 106 years. The philosopher Demonax, a man of the most severe manners and uncommon stoical apathy, lived likewise 100. Being asked, a little before his death, how he wished to be buried, he replied, "Give yourself no concern on that point; the smell will soon bury the carcass." "But," returned his friends, "do you wish, then, to become food to the dogs and the birds?" "Why not?" replied he; "during my whole life I have endeavoured as much as I could to be serviceable to man, why should I not, after my death, be of some use also to animals?"

Even in modern times philosophers seem to have obtained this pre-eminence, and the deepest thinkers appear in that respect to have enjoyed, in a higher degree, the fruits of their mental tranquillity. Kepler and Bacon both attained to a great age; and Newton, who found all his happiness and pleasure in the higher spheres, attained to the age of 84.\* Euler, a man of incredible industry, whose works on the most abstruse subjects amount to above three hundred, approached near to the same age: and Kant, the first philosopher now alive, still shows that philosophy not only can preserve life, but that it is the most faithful companion of the greatest age, and an inexhaustible source of happiness to one's self and to others.†

Academicians, in this respect, have been particularly distinguished. I need mention only the venerable Fontenelle, who wanted but one year of a hundred, and that Nestor, Formey, both perpetual secretaries, the former of the French, and the latter of the Berlin Academy.

We find, also, many instances of long life among school-masters; so that one might almost believe that continual

\* Kepler only reached the age of 59; Bacon attained that of 78; and Euler, 77.—EDITOR.

† Kant died in 1804, having lived to the age of 80.—EDITOR.



intercourse with youth may contribute something towards our renovation and support.

But poets and artists, in short all those fortunate mortals whose principal occupation leads them to be conversant with the sports of fancy and self-created worlds, and whose whole life, in the properest sense, is an agreeable dream, have a particular claim to a place in the history of longevity. We have already seen to what a great age Anacreon, Sophocles, and Pindar attained. Young, Voltaire, Bodmer, Haller, Metastasio, Gleim, Utz, and Oeser, all lived to be very old;\* and I here flatter myself

\* The following short list of the ages of distinguished men may be interesting to the reader in this place; for a more complete catalogue, arranged according to the classes of science and literature upon which they shed their light, he is referred to Madden's "Infirmities of Geniuses."

Tasso . . . . .	51	Galileo . . . . .	78
Virgil . . . . .	52	Swift . . . . .	78
Shakspeare . . . . .	52	Roger Bacon . . . . .	78
Moliere . . . . .	53	Corneille . . . . .	78
Daute . . . . .	56	Marmontel . . . . .	79
Pope . . . . .	56	Thucydides . . . . .	80
Ovid . . . . .	57	Juvenal . . . . .	80
Horace . . . . .	57	Young . . . . .	80
Racine . . . . .	59	Plato . . . . .	81
Demosthues . . . . .	59	Buffon . . . . .	81
Lavater . . . . .	60	Goethe . . . . .	82
Galvani . . . . .	61	Claude . . . . .	82
Boccaccio . . . . .	62	West . . . . .	82
Fenelon . . . . .	63	Franklin . . . . .	84
Aristotle . . . . .	63	Metastasio . . . . .	84
Cuvier . . . . .	64	Herschell . . . . .	84
Milton . . . . .	66	Anacreon . . . . .	85
Rousseau . . . . .	66	Newton . . . . .	85
Erasmns . . . . .	69	Voltaire . . . . .	85
Cervantes . . . . .	69	Halley . . . . .	86
Beaumarchais . . . . .	69	Sophocles . . . . .	90
Dryden . . . . .	70	Leenwenhocck . . . . .	91
Petrarch . . . . .	70	Hans Sloane . . . . .	93
Lesage . . . . .	70	Whiston . . . . .	95
Linnæus . . . . .	71	Michael Angelo . . . . .	96
Locke . . . . .	73	Titian . . . . .	96
La Fontaine . . . . .	74	Herodias . . . . .	100
Handel . . . . .	75	Fontenelle . . . . .	100
Reaumur . . . . .	75	Georgias . . . . .	107

with the hope, and I shall no doubt be joined in my wish by every one of my readers, that Wieland, the prince of the German poets, may afford the newest confirmation of this position.\*

The most extraordinary instances of longevity are to be found, however, only among those classes of mankind who, amidst bodily labour, and in the open air, lead a simple life agreeable to nature, such as farmers, gardeners, hunters, soldiers, and sailors. In these situations man still attains to the age of 140, and even 150. I cannot here deny myself the pleasure of giving a more particular account of some of these instances; for, in cases of this kind, the most trifling circumstance is often interesting, and may be of importance.

In the year 1670 died Henry Jenkins, of Yorkshire. He remembered the battle of Floddenfield in 1513, and at that time he was twelve years of age. It was proved, from the registers of the Chancery and other Courts, that he had appeared, 140 years before his death, as an evidence, and had an oath administered to him. At the time of his death he was, therefore, 169 years old. His last occupation was fishing; and when above the age of 100, he was able to swim across rapid rivers.

Next to him, in point of age, is another Englishman, Thomas Parr, of Shropshire. He was a poor farmer's servant, and obliged to maintain himself by daily labour. When above 120 years of age, he married a widow for his second wife, who lived with him twelve years, and who asserted that during that time he never betrayed any signs of infirmity or age. Till his 130th year he performed all his usual work, and was accustomed even to thresh. Some years before his death, his eyes and memory began to fail; but his hearing and senses continued sound to the last. In his 152nd year his fame had reached London; and as the King was desirous of seeing so great a rarity, he was induced to undertake a journey thither.

\* Wieland died insane at the age of 80, in January, 1813.—  
EDITOR.

This, in all probability, shortened his existence, which he otherwise might have preserved some years longer; for he was treated at Court in so royal a manner, and his mode of living was so totally changed that he died soon after, at London, in 1635. He was 152 years and nine months old, and had lived under nine kings of England. What was most remarkable in regard to this man is, that when his body was opened by Dr. Harvey, his internal organs were found to be in the most perfect state, nor was the least symptom of decay to be discovered in them. His cartilages even were not ossified, as is the case in all old people. The smallest cause of death had not yet settled in his body; and he died merely of a plethora, because he had been too well treated.

This Parr is a proof that, in many families, a constitution so favourable to longevity may transmit a remarkably good *stamen vitæ*. His great grandson died at Cork, a few years ago, at the age of 103.

The following instance is almost of the same kind:—A Dane, named Draakenberg, born in 1626, served as a seaman in the Royal Navy till the 91st year of his age, and spent fifteen years of his life as a slave in Turkey, and in the greatest misery. When he was 111, and had settled to enjoy tranquillity, he resolved to marry, and united himself to a woman of threescore. He, however, outlived her a long time; and, in his 130th year, fell in love with a young country girl, who, as may well be supposed, rejected his proposal. He then tried his fortune with several others, but as he had no better success, he at length resolved to continue single, and in that condition lived sixteen years. He died in the year 1772, in the 146th year of his age. He was a man of a rather violent temper, and exhibited frequent proofs of his strength during the last years of his life.

In the year 1757, J. Effingham died in Cornwall, in the 144th year of his age. He was born of poor parents in the reign of James I., and had been brought up to labour from his infancy. He had served long as a soldier and corporal;

and had been present at the battle of Hochstedt. He at length returned to the place of his nativity, and worked as a day-labourer till his death. It is to be remarked, that in his youth he never drank strong, heating liquors; that he always lived remarkably temperately, and seldom ate flesh. Till his 100th year he scarcely knew what sickness was; and, eight days before his end, he had walked three miles.

In the year 1792, died, in the Duchy of Holstein, an industrious day-labourer, named Stender, in the 103rd year of his age. His food, for the most part, was nothing but oatmeal and butter-milk. He rarely ate flesh; and what he used was always much salted. He scarcely ever had thirst, and therefore drank very seldom. He was fond of smoking tobacco. In his old age he first began to drink tea, and sometimes coffee. He lost his teeth early. He was never sick; and could not be out of humour; that is to say, it was physically impossible that his bile should ever overflow. He avoided with great care every cause of strife or contention. He had the greatest trust in Providence; and this was his consolation and support in all his misfortunes and troubles. His chief dependence always was in the goodness of God.

One of the most singular instances that, amidst the ficklest sports of fortune, continual danger, and the most destructive influences, the life of man may be preserved to an incredible length, is the following:—An old soldier, named Mittelstedt, died in Prussia, in the year 1792, in the 112th year of his age. This man was born at Fissahn, in that country, in the month of June, 1681; and was lost at the gaming-table by his master, who in one evening staked his whole equipage and six more servants. He then entered into the army, and served as a soldier sixty-seven years. He was present in all the campaigns under Frederick I., Frederick William I., and Frederick II., and, in particular, in those of the seven years' war; and had been engaged in seventeen general actions, in which he braved numberless dangers and received many wounds.

In the seven years' war his horse was shot under him, and he was then taken prisoner by the Russians. After supporting all these difficulties, he married; and having lost two wives successively, he married a third, in 1790, when he was in the 110th year of his age. A little before his death he was still able to walk two miles, every month, in order to receive his small pension.

The same year, died at Neus, in the Archbishopric of Cologne, H. Kauper, a veteran of 112. He was a man of a strong make; had been accustomed to walk a little every day; could read till his death without spectacles, and retained the use of his senses to the last.

Helen Gray died a few years ago, in the 105th year of her age. She was of small stature, exceedingly lively, peaceable, and good-tempered, and a few years before her death acquired new teeth.

Thomas Garriek was alive last year (1795), in the county of Fife, in the 108th year of his age. He still possessed great vigour; and was celebrated, as he always had been, on account of his extraordinary appetite. For twenty years he had never been confined to his bed by sickness.

Not long ago there was still alive at Tacony, near Philadelphia, a shoemaker named R. Glen, in the 114th year of his age. He was by birth a Scotchman, had seen King William III., enjoyed the perfect use of his sight and memory, ate and drank with a keen appetite, had a good digestion, laboured the whole week, and on Sunday walked to hear divine service in the church at Philadelphia. His third wife was still alive; she was thirty years of age, and lived happily with her husband.

A certain baron, Baravieino de Capellis, died in 1770, at Meran, in Tyrol, at the age of 104. He had been married to four wives: the first he married in his fourteenth, and the last in his eighty-fourth year. By his fourth wife he had seven children, and when he died she was pregnant with the eighth. The vigour of his body and mind did not forsake him till the last months of his life. He never used spectacles, and when at a great age would frequently



walk a couple of miles. His usual food was eggs ; he never tasted boiled flesh ; sometimes he ate a little roasted, but always in very small quantity : and he drank abundance of tea with *rosa-solis*\* and sugar-candy.

Anthony Senish, a farmer of the village of Puy, in Limoges, died in 1770, in the 111th year of his age. He laboured till within fourteen days of his death ; had still his teeth and his hair ; and his sight had not failed him. His usual food was chestnuts and Turkish eorn. He had never been bled, nor used any medicine.

These are all the instances of great age, in modern times, with which I am acquainted. Persons of 100 years I omit, for these are more eommon. A carpenter died a few years ago at Bürgel, near this plaec, in his 104th year. He worked daily till his death ; and his favourite employment, at last, was spinning yarn. One day, as he was sitting at his wheel, his daughter observed it motionless ; she immediately went up to him, and found him dead.

Physicians, who so abundantly dispense to others the means of health and life, ought to elaim here a distinguished place. But unfortunately this is not the case. It may be said of them, in general: *Aliis inserviendō consumuntur ; aliis medendo moriuntur.*†

At any rate, mortality is greater among praetical physieians than perhaps among men of any other profession. They have the least opportunity of observing those prudential rules and precautions, for preserving health, which they lay down to others ; and there are few employments in which the powers both of the body and mind are exposed to so much consumption as in this. Head and feet must be always exercised in eommon. But the greatest mortality prevails during the first ten years of their practice. A physician who has fortunately withstood that period, attains to a certain strength of constitution, a kind of insensibility to fatigue and the eauses of disease ; by

\* A plant having the character of being a "cordial."—EDITOR.

† In serving others they are consumed ; in healing others they are destroyed.—EDITOR.



custom, noxious effluvia and the poison of infectious disorders become less prejudicial; and he acquires more indifference for the heart-melting scenes of woe, and the numberless miseries, the consequences of vice and moral evil, which his business condemns him to be a daily spectator of: and thus a physician who has luckily passed his time of probation, may become an old man.

A striking instance of this is afforded by our predecessor, Hippocrates, who lived to the age of 109. His whole life was employed in the study of Nature, in travelling, and in visiting the sick; but he passed more of his time in small villages and in the country than in great cities. Galen, Crato, Forestus, Plater, Hoffman, Haller, Van Swieten and Boerhaave all attained to a considerable age.\*

In regard to shortness of life, miners, and those employed in melting-houses, are particularly distinguished, as well as those who live under the earth, or are continually exposed to poisonous effluvia. In some mines, which contain much arsenic and cobalt, the workmen do not live to be older than thirty.

I shall now take a short view of the difference of age, as arising from climate, or rather the nature of the soil.

Sweden, Norway, Denmark, and England have, in modern times, without doubt, produced the oldest men.†

\* The following list embraces a few distinguished names of medical philosophers who have attained an advanced age:—

Boerhaave . . . . .	70	Harvey . . . . .	81
Haller . . . . .	70	Mead . . . . .	81
Tissot . . . . .	70	Duhamel . . . . .	82
Gall . . . . .	71	Astruc . . . . .	83
Darwin . . . . .	72	Hoffman . . . . .	83
Van Swieten . . . . .	72	Pinel . . . . .	84
Fallopins . . . . .	72	Swedenborg . . . . .	85
Jenner . . . . .	75	Morgagni . . . . .	89
Heister . . . . .	75	Heberden . . . . .	92
Cullen . . . . .	78	Ruysch . . . . .	93
Galen . . . . .	79	Hippocrates . . . . .	109
Spallanzani . . . . .	79		

—EDITOR.

+ In England, during the seven years 1838—44, there died at the age of 100 and upwards, 788 persons; namely, 256 males, and 532

Instances of some who attained to the age of 130, 140, 150, have occurred in these countries.

However favourable a northern climate may be to longevity, too great a degree of cold is, on the other hand, prejudicial to it. In Iceland, and the northern parts of Asia, such as Siberia, men attain at most to the age of sixty or seventy.

Besides England and Scotland, Ireland is celebrated for the longevity of its inhabitants. In Dunsford, a small place in that country, there were living, at one time, eighty persons above the age of fourscore. And Lord Bacon says there was not a village in the whole island, as he believed, in which there was not one man upwards of eighty.

In France, instances of longevity are not so abundant; though a man died there, in the year 1757, at the age of 121.

The case is the same in Italy; yet in the northern province of Lombardy there have been some instances of great age.

In Spain, also, there have been some instances, though seldom, of men who lived to the age of 110.

That healthy and beautiful country, Greece, is still as celebrated as it was formerly in regard to longevity. Tournefort found, at Athens, an old consul who was 118 years of age. The island Naxos is particularly celebrated on this account.

Even in Egypt and India there are instances of long life, particularly among the Bramins, Anchorites, and Hermits, who detest the indolence and intemperance of the other inhabitants of these countries.

Ethiopia formerly was much celebrated for its longevity; but a contrary account is given of it by Bruce.

Some districts of Hungary are particularly distin-

females: giving an average of  $112\frac{1}{2}$  annually. Of this number a very small proportion, namely 72 (27 males, 45 females), were returned from London; while 137 (43 males, 94 females) were inhabitants of Wales.—EDITOR.

guished by the great age of the people who reside in them.

Germany contains abundance of old persons; but it affords few instances of very long life.

Even in Holland people may become old; but this is not often the case, and few live there to the age of a hundred.

## CHAPTER VI.

Result of the above observations. Age of the world has no influence on that of its inhabitants. Influence of climate and of the atmosphere. Islands and peninsulas. Countries in Europe most favourable to longevity. Advantages of temperance. The two most dreadful extremes of mortality in modern times. Moderation in all things has great effect in prolonging life. State of marriage. Female sex. Industry. Frugality. Civilization. Rural life. Renovation possible. Extent of human life determined. Absolute and relative duration of it. Tables respecting the latter.

THAT I may not tire the patience of my readers by too great a multitude of examples, I shall here stop, and, in future, introduce them only occasionally, as the subject may require.

Let me be permitted, therefore, to collect the general result of the observations above made, and to draw from them the following important conclusions:—

I. The age of the world hitherto has had no perceptible influence on that of man; and people may still become as old as in the time of Abraham, and even of earlier epochs. There certainly have been periods when men lived sometimes longer and sometimes shorter; but this evidently did not arise from the world, but from man himself. When men were in a savage state, simple, laborious children of Nature, and much exposed to the open air, as shepherds, hunters, and farmers, great age was very common among them; but when they began gradually to despise the dictates of Nature, to study refinement, and to indulge in luxury, the duration of their life became shorter. The same people, however, restored by a revolution to their former rude state, and to manners more agreeable to

Nature, can again attain to their ancient longevity. These, consequently, are unsettled periods, which only pass away and return. Mankind, in general, do not suffer by them, and retain that duration of life which is appointed for them.

II. Man, as we have above seen, can, in almost all climates, in the frigid or torrid zone, attain to a great age. The only difference seems to be, that this is the case in some much more than in others; and that though man can attain to a great age, people in general do not attain to the greatest.

III. Even in districts where mortality in general is very great, individuals may attain to a greater age than in places where general mortality is less. I shall, by way of example, mention the warm countries of the East. There, mortality, upon the whole, is very small: hence their extraordinary population; and infancy, in particular, suffers there much less on account of the continually uniform and pure temperature of the atmosphere. Yet a much smaller proportion of old people are found in these countries than in the northern, where mortality in general is greater.

IV. Places, the situation of which is high, have, in general, more and purer air than those which stand low; though here, also, there is a certain limitation, and the rule cannot be thus laid down: the higher the better. The greatest degree of height, the glaciers, is, on the contrary, prejudicial to health; and Switzerland, without doubt the highest land in Europe, has produced fewer instances of longevity than Scotland. For this there are two reasons: First, the atmosphere at a great height is too dry, ethereal, and pure, and consumes, therefore, speedier. Secondly, the temperature of it is too variable; heat and cold succeed each other too rapidly; and nothing is more unfavourable to duration of life than very sudden changes.

V. In cold climates, men in general become older than in warm; and for two reasons: First, because, in warm countries vital consumption is greater; and secondly,

because, in cold countries, the climate, being more temperate, checks vital consumption. This, however, is the case only in a certain degree. By the highest cold, such as that of Greenland, Nova Zembla, &c., the duration of life is shortened.

VI. Uniformity in the state of the atmosphere, particularly in regard to heat, cold, gravity, and lightness, contributes, in a very considerable degree, to the duration of life. Countries, therefore, where sudden and great variations in the barometer and thermometer are usual, cannot be favourable to longevity. Such countries may be healthy, and many men may become old in them; but they will not attain to a great age, for all rapid variations are so many internal revolutions; and these occasion an astonishing consumption, both of the powers and the organs. In this respect Germany is particularly distinguished; for its situation renders it subject to a continual mixture of heat and cold, of northern and southern climate, where one often experiences, in the course of the same day, both frost and the utmost heat; and where the month of March may be extremely warm, and that of May accompanied with snow. This uncertainty of the climate of Germany is undoubtedly the principal cause that, notwithstanding the healthfulness of its situation in other points of view, and though in general people attain there to a considerable age, instances of very great age occur much more rarely than in neighbouring countries lying almost under the same degree of latitude.

VII. Too high a degree of dryness, as well as too great moisture, are unfavourable to duration of life. Air, therefore, which contains a mixture of fine moisture, is the best for attaining to great age. The reasons are as follow: Moist air, being in part already saturated, has less attractive power over bodies; that is to say, consumes them less. Besides, in a moist atmosphere there is always more uniformity of temperature; and fewer rapid revolutions of heat and cold are possible. Lastly, an atmosphere somewhat moist keeps the organs longer pliable



and youthful; whereas that which is too dry brings on much sooner aridity of the vessels, and all the characteristics of old age.

A most striking proof of this is afforded by islands; for we find that these, as well as peninsulas, have at all times been, and still are, the cradles of old age. In islands mankind always become older than in continents lying under the same degree of latitude. Thus men live longer in the islands of the Archipelago than in the neighbouring countries of Asia; in Cyprus, than in Syria; in Formosa and Japan, than in China; and in England and Denmark, than in Germany.

Salt water also is more favourable to longevity than fresh; and for that reason seafaring people can become so old. Stagnated fresh water, on the other hand, is hurtful, by its mephitic evaporation.

VIII. A great deal seems to depend likewise on the ground and soil, in a word, on the whole *genius loci*; and in this respect a cold soil appears to be the least calculated to promote longevity.

IX. According to experience, England, Denmark, Sweden, and Norway, are the countries where men attain to the greatest age; and we find by accurate observation, that all the before-mentioned properties are in these united. On the other hand, Abyssinia, some parts of the West Indies, and Surinam, are countries where the life of man is shortest.

X. The more a man follows Nature, and is obedient to her laws, the longer he will live; the further he deviates from these, the shorter will be his existence. This is one of the most general of laws. In the same districts, therefore, as long as the inhabitants lead a temperate life, as shepherds or hunters, they will attain to old age; but as soon as they become civilized, and by these means sink into luxury, dissipation, and corruption, their duration of life will be shortened. It is, therefore, not the rich and great, not those who take gold tinctures and wonder-working medicines, who become old; but country labourers,

farmers, mariners, and such men as perhaps never in their lives employed their thoughts on the means which must be used to promote longevity. It is among these people only that the most astonishing instances of it are to be observed.

XI. The most dreadful degree of human mortality, occasioned by two inventions of modern times, is to be found among the slaves in the West Indies. and in hospitals for foundlings. Of the negro slaves, one in five or six dies annually; a proportion equal to that which takes place during the ravages of the most inveterate pestilence. And of 7000 children who are every year brought into the foundling hospital at Paris, 180 only are alive at the end of ten years; so that 6820 perish, and no more than one in forty escapes from that sepulchre. Is it not highly worthy of remark, and a new proof of our former position, that mortality prevails in the greatest degree where men deviate farthest from Nature; where her most sacred laws are despised; and where her first and strongest bonds are torn asunder? Where man, in the most evident manner, sinks below the brute, there the child is dragged from its mother's breast, and consigned helpless to the care of hirelings; there one brother is separated from another, from his home, from his native soil, and transferred to a strange and unhealthy climate, where, without hope, without comfort, and without enjoyment, while his heart continually sighs after those he left behind, he pines to death, oppressed with severity and labour. I am acquainted with no contagion, no plague, no state of mankind, either in ancient or modern times, during which mortality prevailed to the degree which it does in orphan-houses. To produce this evil required an excess of refinement reserved only for the most modern times. It required the aid of those wretched political calculators who can assert that the state is the best mother, and that nothing more is necessary to increase population than to declare children to be its property, to place them under its protection, and to establish a public abyss, which may

swallow them up. People now see, when it is too late, the horrid consequences of this unnatural maternity; this contempt of the first grand pillar of human society, *marriage* and *parental duty*. In so dreadful a manner does Nature avenge every transgression of her most sacred commands.

XII. The result of all experience, and a principal ground of longevity, is, *omnia mediocria ad vitam prolongandam sunt utilia*. Moderation in everything, the *aurea mediocritas*, so much extolled by Horaec, and which Hume calls the best thing on earth, is indeed of the utmost efficacy in prolonging life. In a certain mediocrity of condition, climate, health, temperament, constitution, employment, spirits, diet, &c., lies the greatest secret for becoming old. By all extremes, either too much or too little, too high or too low, prolongation of life is impeded.

XIII. The following circumstance also is worthy of remark. All those people who have become very old, were married more than once, and generally at a very late period of life. There is not one instance of a bachelor having attained to a great age. This observation is as applicable to the female as to the male sex; and hence it would appear that a certain abundance in the power of generation is favourable to longevity. It forms an addition to the vital power; and this power of procreation seems to be in the most intimate proportion to that of regenerating and restoring one's self; but a certain regularity and moderation are requisite in the employment of it; and marriage is the only means by which these can be preserved.

The greatest example of this is a Frenchman, named De Longueville, who lived to the age of 110. He had been married to ten wives; his last wife he married when in his ninety-ninth year, and she bore him a son when he was in his hundred-and-first.

XIV. More women than men become old; but men only attain to the utmost extent of longevity. The equilibrium and pliability of the female body seem, for a certain

time, to give it more durability, and to render it less susceptible of injury from destructive influences. But male strength is, without doubt, necessary to arrive at a very great age. More women, therefore, become old; but fewer very old.

XV. In the first half of man's age, an active, even a fatiguing life, is conducive to longevity; but in the last half, a life that is peaceful and uniform. No instance can be found of an idler having attained to a remarkably great age.

XVI. Rich and nourishing food, and an immoderate use of flesh, do not prolong life. Instances of the greatest age are to be found among men who from their youth lived principally on vegetables, and who perhaps never tasted flesh.

XVII. A certain degree of cultivation is physically necessary for man, and promotes duration of life. The wild savage does not live so long as man in a state of civilization.

XVIII. To live in the country, and in small towns, is favourable to longevity: to live in great towns is unfavourable. In great cities, from one in twenty-five to one in thirty die every year; in the country, from one in forty to one in fifty.\* Mortality among children is in parti-

\* The data upon which Hufeland founded these statements were of a very inefficient character, as compared with those which we possess at the present day, in the labours of the Registrar-General. Thus, instead of the mortality of large cities ranging from 1 in 25 to 1 in 30, the highest known rate of mortality, namely that of Liverpool, is 1 in 30; while in the metropolis of London it is only 1 in 40. In the country, taking as examples, Kent, Surrey, and Northumberland, it ranges between 1 in 51, and 1 in 71½. In further illustration of this subject, I have selected the following examples from the Registrar-General's Report on the Mortality of England during the Seven Years 1838-44:—

	Males.		Females.
All England .....	1 in 44	...	1 in 47½
Liverpool.....	1 „ 28	...	1 „ 32
London .....	1 „ 37	...	1 „ 43
Kent .....	1 „ 48	...	1 „ 54
Surrey (rural).....	1 „ 54	...	1 „ 57

cular much increased by living in great cities, so that one half of those who are born die generally before the third year; whereas, in the country, the half are not carried off until the twentieth or thirtieth.\* The smallest degree of human mortality is one in sixty annually; and this proportion is found only here and there among country people.†

XIX. Among some men a kind of renovation seems to be really possible. In several instances of great age it has been remarked that persons in their sixtieth or seventieth year, when others cease to live, acquired new teeth and new hair, and commenced as it were a new period of life, which continued twenty or thirty years longer: a kind of self-reproduction which is to be observed only among the more imperfect part of the creation.‡

The most remarkable instance of this kind, with which I am acquainted, is an old magistrate named Bamberg,

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	Males.		Females.
Thanet and Eastry .....	1 in 54	...	1 in 64
Hendon and Barnet .....	1 „ 61	...	1 „ 63
Bideford and Holsworthy .....	1 „ 61	...	1 „ 65
Godstone, Reigate, Dorking ...	1 „ 65	...	1 „ 62
Northumberland (3 districts)	1 „ 71	...	1 „ 72

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—EDITOR.

\* According to the Registrar-General's reports on the mortality of children, nearly one half of all that are born alive die before the end of the *fifth* year in Liverpool; while the same number in London live to the age of 33; and in the county of Surrey to 50. In 1845 nearly one half of all the children born in Birmingham died under *five* years of age; the entire half in Manchester died in the same period; and more than one half in Liverpool. In London the proportion was between one-half and one-third; and in Wales less than one-third.—EDITOR.

† In Northumberland, as is shown in the above table, it is 1 in 71½.—EDITOR.

‡ In my work on "Healthy Skin" I have mentioned several instances of very old persons in whom the natural colour of the hair returned after they had been for years before grey. This was the case with John Weeks, who lived to the age of 114. Sir John Sinclair reports a similar occurrence in an old Scotchman, who lived to be 110; and Susan Edmonds, when in her 95th year, recovered her black hair, but became again grey previously to her death at the age of 105.—EDITOR.



who lived at Rechingen in the Palatinate, and who died, in 1791, in the 120th year of his age. In 1787, long after he had lost all his teeth, eight new ones grew up. At the end of six months they again dropped out, but their place was supplied by other new ones, both in the upper and lower jaw; and Nature, unwearied, continued this labour four years, and even till within a month of his death. After he had employed his new teeth for some time with great convenience in chewing his food, they took their leave, and new ones immediately sprang up in some of the sockets. All these teeth he acquired and lost without any pain; and the whole number of them amounted at least to fifty.

By the observations already made, we are now enabled to come to a conclusion respecting the important question. What is the proper term or boundary of human life? One might believe that some degree of certainty could be acquired on this point; but it is incredible what difference in opinion respecting it prevails among philosophers. Some allow man a very long, and others a very short duration of life. Some are of opinion that, to determine it, nothing is necessary but to examine to what extent it is carried among savages, because in that state of Nature the utmost period of life must be discovered with the greatest precision. This, however, is false. It ought to be considered that this state of Nature is likewise, for the most part, a state of misery, where the want of society and civilization obliges men to waste themselves, and to undergo fatigue superior to their strength; and where, in consequence of their situation, they are exposed to more destructive influences, and enjoy much fewer means of restoration. We must not take our examples from the class of savages; for these, in their properties, participate with the inferior animals: but from that class where man, by culture and civilization, has really become a rational being; for he has then in a physical sense first attained to his destination and pre-eminence, and, by the help of reason, has procured those means of restoration from



without, and that happiness of situation, which it is possible for him to acquire. It is then only that we can consider him as a man, and collect examples from his condition.

One might also believe that death by marasmus, that is to say, by old age, is the true boundary of human life. But this reasoning, in the present times, is attended with great deception; for, as Lichtenberg says, men have found out the art to ingraft old age upon themselves before the time; and one may see very old people of thirty or forty, who have every symptom of extreme age, such as stiffness and aridity, weakness, grey hair, ossified cartilages, &c. which are observed very rarely but among persons who have attained to the age of eighty or ninety. This, however, is an artificial relative old age; and such a standard cannot be employed in a calculation which has for its object the duration of the life of man in general.

Some, therefore, have invented the most singular hypotheses to answer this question. The ancient Egyptians, for example, believe that the heart increased two drachms annually in weight for fifty years, and decreased again fifty years in the same proportion. In the hundredth year, according to this supposition, no more heart remained, and, consequently, the hundredth year was the term or boundary of human life. To answer this question in a satisfactory manner, one must, in my opinion, make the following essential distinction:

1. How long can man exist, in general, considered as a race; and what is the absolute duration of his life? We know that each class of animals has a certain absolute duration of life, and the case must be the same with man.

2. How long can man live as an individual; and what is the relative duration of his life?

With regard to the first question, the research respecting the absolute duration of human life, there is nothing to prevent us from giving it the utmost extent to which, according to experience, it is possible for it to attain. It

is here sufficient to know what man's nature is capable of; and a man who has attained to the farthest boundary of mortal existence, may be considered as a pattern of human nature in its utmost perfection, and as an instance of what is possible for it under favourable circumstances. Now, experience incontestably tells us, that a man still may attain to the age of 150 or 160 years; and what is of the greatest importance is, that the instance of Thomas Parr, whose body was opened in his 152nd year, proves that, even at this age, the state of the internal organs may be so perfect and sound that one might certainly live some time longer; and that no doubt would have been the case with him, had not the manner in which he lived, by his not being accustomed to it, brought on a plethora which proved mortal. We may, therefore, with the greatest probability, assert, that the organization and vital power of man are able to support a duration and activity of 200 years.

This assertion acquires some weight by our finding that it agrees with the proportion between the time of growth and the duration of life. One may lay it down as a rule, that an animal lives eight times as long as it grows. Now, man in a natural state, where the period of maturity is not hastened by art, requires full twenty-five years to attain his complete growth and conformation; and this proportion also will give him an absolute age of 200 years.

It needs not be objected that great age is the unnatural state, or an exception from the rule; and that a shorter life is properly the natural condition. We shall see hereafter, that almost all those kinds of death which take place before the hundredth year are brought on artificially,—that is to say, by disease or accident; and it is certain that the far greater part of men die an unnatural death, and that not above one in a thousand attains to the age of a hundred years.

But with regard to the relative duration of human life: that, indeed, is extremely variable, and as different as each individual. It is regulated according to the goodness or badness of the mass of which the person is formed; his

manner of living; speedier or slower consumption; and a thousand internal and external circumstances which may have an influence on the continuance of his existence. We must not imagine that every man, at present, brings with him into the world a vital stock capable of lasting 150 or 200 years. It is unfortunately the fate of our generation, that the sins of the father often communicate to the embryo a far shorter *stamen vitæ*.\* Let us only reflect on the innumerable host of diseases and accidents which openly and secretly prey upon our lives, and we shall clearly see that it is now far more difficult than ever to attain to that term which human nature is really capable of reaching. That term, however, we must make our foundation; and we shall afterwards examine how far it may be in our power to remove those obstacles which prevent us at present from arriving at it.

The following table, founded on experience, may serve as a proof of the relative duration of human life at present.

Of a hundred men who are born,

50 die before the 10th year,

20 between 10 and 20

10 „ 20 „ 30

6 „ 30 „ 40

5 „ 40 „ 50

3 „ 50 „ 60

Therefore, 6 only live to be above the age of 60.

Haller, who collected the greatest number of instances respecting the age of man, found the relative duration of life to be in the following proportion:

Of men who lived from 100 to 110 years the instances have been . . . . . 1000

110 to 120 . . . . . 60

120 „ 130 . . . . . 29

130 „ 140 . . . . . 15

140 „ 150 . . . . . 6

169 . . . . . 1

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\* Thread of life.—EDITOR.

## CHAPTER VII.

More particular examination of human life. Essential definition of it. Principal operations on which it depends. Accession from without. Assimilation and Animalization. Nutrition and preparation of the organized matter. Power and organs consumed by life itself. Separation and destruction of exhausted parts. Organs necessary for life. History of life. Causes of the long duration of the life of man. Influence of reason and the higher powers of thought. Answer to the question, Why, among men who are more fitted for long life than animals, mortality, however, should be greater?

WE now come to our principal object, the application of the foregoing premises to the prolongation of human life. But before we can be able to accomplish this point, we must first thoroughly examine the following questions: In what does the life of man properly consist? On what organs, powers, and disposition of parts, does this important operation, and the duration of it, depend? In what does it essentially differ from the life of other creatures and beings?

Man, without doubt, is the highest link, the crown of the visible creation; the last, the most complete, and the best finished production of the plastic power of Nature; the highest degree of its self-representation, which our eyes are capable of seeing, or our senses of comprehending. With him our sublunary prospect is closed; he is the extreme point with which and in which the sensible world borders on a higher spiritual world. The organization of man is, as it were, a magic band, by which two worlds of a totally different nature are connected and conjoined; an eternally incomprehensible wonder, by which he becomes,

at the same time, an inhabitant of these two worlds, the material and the intellectual.

One may, with propriety, consider man as a compendium of Nature; as a masterpiece of conformation, in which all the active powers scattered throughout the rest of Nature, all kinds of organs and forms of life, are united in one whole, act in concert, and, by these means, make him, in the strictest sense, a little world; a copy and epitome of the greater, as he was so often called by the ancient philosophers.

His life is the most expanded; his organization the most delicate and best finished; his juices and component parts the most ennobled and best prepared; and his intensive life and self-consumption are, therefore, the strongest. He has, consequently, more points of contact with the whole of Nature by which he is surrounded, and likewise more wants; but he has, also, a richer and more perfect restoration than any other being. The inanimate, mechanical, and chemical powers of Nature; the organic or living powers; and that spark of divine power, the power of thought,—are here united and blended together, in the most wonderful manner, to form that godlike phenomenon which we call the life of man.

Let us now take a short view of the essence and mechanism of this operation, as far as they can be discovered.

The life of man, considered in a physical view, is nothing else than an incessant ceasing and being; a continual change of destruction and restoration; an everlasting contest of chemical, decomposing powers, with all the combining and creative vital powers. New component parts are every moment collected from the whole of Nature that surrounds us; called to life from an inanimate state, and transferred from the chemical to the organic living world; and from these heterogeneous particles the plastic vital power produces a new uniform mass, which, in every point, is stamped with the character of life. But, in the same unceasing manner, the exhausted, worn-out and cor-



rupted component parts, when their combination is dissolved, become subject again to the mechanical and chemical powers, which are in continual contest with the living powers; return from the organic to the chemical world; and again become a part of inanimate nature in general, from which they had been separated for a short time. This uninterrupted business is the work of the vital power ever active within us; and is, consequently, attended with an incessant exertion of that power, which is an important part of vital operation. Life, therefore, is a continual receiving, appropriation, and giving back; an incessant mixture of death and new creation.

What then, in a common sense, we call the life of a creature, considered as a representation, is nothing else than a mere phenomenon, which has nothing peculiar or self-subsistent but the active spiritual power which forms the ground of it, and which binds and regulates the whole. All the rest is only appearance; a grand spectacle continued, where the thing represented does not remain the same a moment, but is incessantly changing; where the whole duration, form and figure of the representation depend, in a particular manner, on the matter employed, which is always varying, and on the manner in which it is used; and the whole phenomenon can exist no longer than the continued influx from without, which supplies nourishment for the process. Its analogy with a flame is, therefore, very great; only that the latter is merely a chemical, and life a chemico-animal process, a chemico-animal flame.

The life of man then, according to its nature, depends on the following grand operations:

I. *Accession and reception of vital nourishment from without.*

By nourishment is here meant not merely what we call food and drink, but much rather that influx, from the atmosphere, of subtle, spiritual, vital nourishment, which seems in a particular manner to contribute towards the support of the vital power, especially as the former coarse nourishing substances serve more for supporting and repair-



ing the matter of the body and of its organs : in a word, not that alone which passes through the mouth and the stomach, since our lungs and skin receive an abundance of vital nourishment, and, for spiritual support, are of much greater importance than the stomach.

II. *Appropriation, assimilation, and animalization; transition from the chemical to the organic world, through the influence of the vital power.*

Everything that enters our bodies must first obtain the character of life before it can be called *ours*. All component parts, nay, the most subtle agents of Nature, which flow into us, must be animalized; that is to say, be so modified and combined, in a totally new manner, by the help of the vital power, that they no longer act according to the laws of inanimate and chemical nature, but according to the peculiar laws of organic life, and support themselves in opposition to others. In short, as component parts of a living body, they cannot be considered singly, but always as compounded according to their proper nature and the laws of the vital power. Everything in us, even chemical and mechanical powers, is, therefore, animalized; and this, for example, is the case with electricity, and oxygen or vital air. As soon as they are made component parts of a living body, they become compounded nature (animalized electricity, animalized oxygen), and cannot be considered merely according to the laws and influence which they had in common nature, but as subject to and acting under specific organic laws. These observations are applicable not only to oxygen, but also to other new chemical discoveries. But we must beware of ascribing to them the same effects in the vital combination of our bodies, as those which we perceive them to have in the atmosphere; for they act according to different and specific laws. This observation, in my opinion, cannot be too often repeated; and it alone may guard us from error in the highly important application of the principles of chemistry to organic life. We, without doubt, have these chemical powers and agencies within us, and a knowledge of them is indispen-

sably necessary ; but their method of operating in our bodies is modified in another manner, as they find themselves in a world altogether different.

This important business of assimilation and animalization is the employment, first of the absorbing and glandular system, in its widest latitude ; not merely of the lacteal vessels, but also of the absorbing vessels of the skin and the lungs, which may be called the vestibule, through which everything that is to form a part of us must pass ; and, secondly, of the system of circulation, by which the component parts are prepared and brought to organic perfection.

III. *Nutrition ; configuration of the animalized component parts ; further ennobling of them.*

The component parts, fully animalized, are now incorporated and changed into organs ; and this operation is the business of the plastic power. By the preparation of the finer and more perfect secreting vessels, these organized component parts are brought to their highest degree of purification and refinement ; through the brain as nervous fluid, and through the organic system as organic juices, both of which are a combination of the purest organic matter, with a rich abundance of vital power.

IV. *Self-consumption of the organs and powers by vital exertion.*

Active life itself is an incessant exertion of agency and power ; and, consequently, attended with a continual waste of power and consumption of the organs. Everything in which the power shows itself as an agent, and active, is exertion ; for no vital exertion, not even the smallest, can be made without excitation and reaction of the power. This is a law of organic nature. The voluntary and insensible internal movements, therefore, of circulation, chylication, assimilation, and secretion, as well as voluntary movements, and those produced by the operations of the mind, are continual exertions of power, and are incessantly consuming both the powers and the organs.

This part of life is of the utmost importance in regard

to its duration and condition. The stronger vital consumption is, the speedier life will be wasted, and the shorter must be its duration: but if it be too weak, the consequence then is too seldom a change of component parts, imperfect restoration, and a bad habit of body.

*V. Separation and new acquisition of component parts; transition of them from the organic to the chemical world, and their union again with inanimate nature in general.*

The component parts which have been used, and which can no longer be retained in this combination, again separate themselves from it. They lose the influence of the vital power, and begin to be decomposed, to fly off, and to be once more united according to the pure chemical laws of Nature. All our excretions, therefore, carry with them the most evident traces of decomposition, a process merely chemical, which, as such, is never possible in a state of real life. The function of discharging these parts from the body is committed to the organs of secretion and excretion, which operate with continual activity; the intestines, kidneys, liver, and, in particular, the whole surface of the skin and lungs. These perform real chcmico-animal operations; the removal of the parts is effected by the vital power, but the productions are entirely chemical.

These grand operations constitute life in general, and at every moment; for they are continually united, continually present, and inseparable from the vital operation.

The organs which belong to life have in part been already mentioned. In the present point of view they may be most conveniently divided into three classes: *Those which receive and prepare; those which evacuate; and those which keep these contrary movements, as well as the whole internal economy, in equipoise and order.* Many thousands of greater or smaller organs are continually employed in separating and throwing off the particles which have been exhausted and corrupted by the internal consumption. Besides the evacuating ducts, properly so-called, the whole surface of the skin and lungs is covered with myriads of secreting organs in continual activity. Equally numerous

and various are the passages of the second class, those of *restoration*. It is not sufficient that the decrease of the coarser parts should be repaired from the nourishment by means of the organs of digestion; the lungs, the organs of respiration, are also continually employed to draw in, from the atmosphere, nourishment, vital heat, and vital power. The heart, and the circulation of the blood, which is dependent on it, serve to regulate their movements; to diffuse to all points the received heat and nourishment; and to drive off, through these passages of excretion, those particles which have been used and exhausted. All these operations are assisted by the influence of the mental powers and their organs, which are the most perfect in man. This, indeed, increases intensive life and self-consumption, but at the same time it is a highly important means of restoration, of which more imperfect beings are destitute.

One may form some idea of the extraordinary self-consumption of the human body, when one reflects that the pulsation of the heart, and the motion of the blood connected with it, take place 100,000 times every day; that is to say, the heart and all the arteries are contracted 100,000 times daily, with such force as is able to keep a resistance of from fifty to sixty pounds of blood in continual movement. What clock, what machine of the hardest iron, would not by such use be in a short time worn out? If we add to this the almost equally incessant muscular motion of our bodies, which must occasion a much greater wasting, as these parts consist more of tender gelatinous particles, we may then have a pretty just conception with what loss of substance a walk, for example of ten miles, or a rapid journey of thirty, must be attended. And not only soft and fluid parts, but even the hardest, are gradually worn out by continual use. This may be clearly perceived in the teeth, which are evidently destroyed by long use, and which, on the other hand, by being not used, that is, not exposed to antagonists, become exceedingly



long. It is proved that, in this manner, we should be very soon destroyed were there no reparation; and it has been estimated, with great probability, that every three months our bodies are no longer the same, but consist of entirely new particles.

But equally wonderful and extraordinary is the continual reparation of those parts which have been lost. This may be readily comprehended; because, notwithstanding the incessant loss which we sustain, our mass still continues the same. The fluid parts, however, regenerate themselves soonest; and experience has taught us, that the greatest loss of blood may be again repaired in fourteen days. The solid parts reproduce themselves by the same power and mechanism as are employed in their first creation; the gelatinous nourishing principle is conveyed by circulation to every part of the body, and is organized according to the plastic laws of the different parts. The bones even which are the hardest become regenerated, as is proved in the experiment with madder, by the use of which the bones in a short time become red. Whole bones lost or decayed can renew themselves also; and one finds sometimes with astonishment, in pieces of ivory, the hardest animal body, leaden bullets, which must have been lodged in them by a shot, and which are entirely surrounded with solid bone.\*

\* The fact is true, but the explanation removes the wonder. That a bullet should perforate solid ivory, and that the vacuity caused by its passage should close up and become firm and solid is, of course, impossible. The explanation of the phenomenon is as follows:—The tusk of the elephant continues to grow as long as the animal lives; for this purpose it is furnished with a permanent producing organ, or pulp, which occupies the root of the tusk. The pulp is conical in shape, and, as it is constantly engaged in forming successive layers of ivory, the tooth is gradually pushed forwards, in other words, it grows. Now, if a bullet enter the substance of this pulp it will, in time, by a common process of expulsion of foreign bodies, reach the surface of the pulp; and, when that is effected, the next layer of ivory formed by the pulp will be deposited between the pulp and the bullet; so that now the bullet is not only excluded from the pulp, but the pulp has covered it over with a

The usual progress or history of human life is, in a few words, as follows :—

The heart, the grand source of all vital motion as well as vital diffusion, and the grand principle of the excreting as well as renovating operations, becomes always smaller in proportion to the increase of age ; so that, at length, it occupies an eighth part of the space which it did in the beginning of life.\* Its substance also becomes always thicker and harder ; and its irritability becomes in the same proportion less. The active powers then decrease more and more every year ; and the retarding powers, on the other hand, increase. The same thing takes place in the whole vascular system, and the organs of motion. All the vessels become gradually harder, narrower, more shrivelled, and unfit for use ; the arteries are ossified and a great many of the finer vessels are entirely closed up.

The following, therefore, are the unavoidable consequences :—

1st. By this closing up and becoming shrivelled, the most important and finest organs of vital regeneration, the passages for assimilation and external accession, the lungs, skin, absorbing and lacteal vessels become deranged ; and, consequently, the addition of nourishing and enlivening component parts from without is rendered weaker. Nou-

layer of ivory, and as layer after layer of new ivory is formed, the bullet becomes more and more deeply buried, more and more removed from the pulp, and eventually may be found in the solid substance of the ivory several inches, or even feet, distant from its original bed.—EDITOR.

\* Hufeland must have meant “an eighth less space;” he could hardly have intended to make a statement so perfectly erroneous as the above, upon a point so easily put to the proof. The heart, undoubtedly, diminishes a little in size in healthy old age ; becomes firmer in texture, and less frequent in its pulsations ; adapting itself in fact to the smaller volume of blood contained within the body ; but the amount of diminution is very trifling. In a preceding page (87), the author ridicules, very justly, the hypothesis of the ancient Egyptians concerning the decrease of the heart ; and in the examination of Thomas Parr, to which he also refers (p. 71), the heart, so far from being diminished in size, was found to be “great, thick, fibrous, and fat.”—EDITOR.



ishment can neither be received in such quantity, nor be prepared and diffused so well as before.

2nd. By this increasing hardness and aridity of the vessels they lose more and more their power of movement and sensation. Irritability and sensibility decrease always in the same proportion as the former increase; and the active and spontaneous powers within us always give more place to the destructive, mechanical, and chemical powers.

3rd. By the decrease of the motive power, and the closing up of innumerable vessels, excretion, the most indispensable cause of our continual purification, and of the removal of corrupt particles, principally suffers. The skin, its most important organ, becomes with years always closer, more impenetrable, and less useful. This is the case also with the kidneys, the pores of the intestines, and the lungs. The juices, therefore, in old age, must be always more impure, more acrid, tougher, and more impregnated with earthy particles. Earth, the great enemy of vital motion, acquires in our bodies, by these means, a preponderance; and thus, with a living body, we insensibly approach our final destination: "Return to the earth from which thou wast taken!"

In this manner does life bring on a cessation of life, that is, natural death; and its progress is as follows:—

The powers subject to the will first decrease, and then the spontaneous and proper vital movements. The heart can no longer force the blood to the extremities; pulsation and heat leave the feet and hands; but the blood is still kept in motion from the heart and larger vessels, and thus the vital flame, though weak, is for some time preserved. At length, the heart has not strength to press the blood through the lungs. Nature now employs all her power to invigorate respiration, and by these means to give some passage to the blood. This power, at last, is exhausted; the left ventricle of the heart, consequently, receives no more blood, and is no longer irritated, and continues at rest. The right still receives a little transmitted to it from parts already half dead; but these parts

soon become perfectly cold ; the juices curdle ; the heart receives heat no more, all its motion ceases, and death is complete.

Before I proceed further I must examine some problematical circumstances, which present themselves in the course of every research into the duration of human life, and which are deserving of particular attention.

The first problem is : *How is it possible that man, whose organization is the most delicate and most complex, whose self-consumption is the most rapid, and whose duration of life ought consequently to be the shortest, should, however, exceed so evidently, in duration of life, all classes of the more perfect animals, which have the same size, the same organization, and the same place in the scale of creation ?*

It is well known that the more imperfect the organization, the greater is the duration of life, or at least the vital tenacity. Man, as the most perfect of all creatures, ought consequently, in this respect, to be far inferior to others. Besides, it appears from the foregoing research, that the duration of life of an animal will be shorter the more numerous its wants are for supporting that life. Of these, man without doubt has the greatest number, and this is a new ground for a shorter duration. It has been likewise shown already that, among animals, the highest degree of self-consumption is the process of generation, and that it shortens in a very sensible manner their duration of life. In this the perfection of man is remarkably apparent ; and in him there is also a new kind of generation, the spiritual, or the business of thinking ; and his duration must thereby suffer still more.

It may be asked, then, by what means has man such a superiority in regard to the duration of life ?

In my opinion, the question may be answered from the following grounds :—

I. The texture of the whole cellular membrane is much softer and tenderer in man than in animals of the same class. Even the so-called nervous coat of an intestine is, in a dog, much harder, and cannot be so inflated as that of

a man. The veins also, the bones and the brain, are, in animals, much more solid, and abound with a greater quantity of earth. Now, I have before shown that too great a degree of hardness or brittleness in the organs is prejudicial to duration of life, because the organs thereby lose sooner their pliability and fitness for use; and because that stiffness and aridity which bring on old age, and at length a complete stoppage of the whole machinery, are thus hastened; man, consequently, must have old age later, and a more extensive period of life.

II. Man grows more slowly; attains later to maturity; all his powers are longer in expanding; and I have before shown, that the existence of a creature is lengthened in proportion to the time required for its expansion.

III. Sleep, the greatest means of vital retardation and support, is in man more peculiarly regular and constant.

IV. The perfect organization of the soul,\* the faculty of thinking,—that is, reason, makes in man a very great difference.

This higher and divine power, which exists in man alone, has the most visible influence, not only on his character in general, but also on the perfection and duration of his life; and in the following manner:—

1st. It is perfectly natural that the sum of the active vital powers within us should be increased by the assistance of this most pure and divine power.

2nd. Man, by the most refined and most perfect organization of the brain, acquires an entirely new organ of restoration peculiar to himself; or rather, his whole vital capacity is thereby increased.

\* I hope my readers will not here misunderstand my meaning, and imagine that I reckon the soul to be a part, a production, or property of the body. This is by no means the case. The soul, in my opinion, is something distinct from the body; a being of a totally different, more exalted, intellectual world; but in this sublunary combination, and to be a *human soul*, it must have organs to fit it not only for action, but also for sensation, and even for the higher functions of thinking and combining ideas. The first *cause of thought* is, therefore, spiritual; but the *business of thinking* itself, as carried on in this mortal machine, is organic.

3rd. By this highly perfect power of the soul, man enters into connexion with an entirely new world—the *spiritual*; which is concealed from the rest of the creation. It gives him points of contact altogether new—new influences, and a new element. Might not one in this respect call man an amphibious being (pardon the expression) of a higher kind, for he is a being who lives at the same time in two worlds, the material and the intellectual; and apply to him what I have shown from experience, respecting amphibious animals, that existence in two worlds at the same time prolongs life? What an immense ocean of spiritual nourishment and spiritual influences is opened to us by this higher and more perfect organization. An entirely new class of means to nourish and excite the vital power, peculiar to man alone, here presents itself. I mean the more refined mental and more exalted moral sensations and affections. I shall, on this occasion, mention only the enjoyment and comfort which lie in music; the art of painting, and the enchantments of poetry, and the imagination; the pleasure which attends the investigation of truth or a new discovery; the rich source of happiness that may be found in the idea of futurity; in the power of anticipating it, and of living, through hope, when the scenes now present shall be no more. What comfort, what unshaken firmness may we not acquire from the single idea and belief of immortality. In short, the circle of human life is hereby extended in an astonishing manner; and man actually derives his vital subsistence from two worlds at the same time, the material and the immaterial, the present and the future. His duration of life must, therefore, necessarily be a gainer.

4th. The more perfect powers of the soul contribute also so far to the support and prolongation of life, that man thereby is made a partaker of *reason*, which enables him to regulate his conduct in all things; which moderates instinct, a faculty merely animal, as well as the furious passions, and the rapid consumption connected with them;

and which, by these means, is able to preserve him in that middle state which we have already shown to be so necessary for long life.

In short, man evidently has more spiritual part than was requisite for him in the present world ; and this superabundance of spiritual power carries with it, as it were, the bodily. It is the bodily only, which is subject to wasting, and to death.

I cannot here omit to remark, how apparently the moral object, the higher destination of man, is interwoven with his physical existence : and how *reason*, and the *higher powers of thought*, which properly render him a man, display not only his moral, but his physical perfection ; consequently, a proper cultivation of his spiritual powers, particularly the moral, makes him, beyond all dispute, more perfect, not only morally, but also physically ; and, as we shall have occasion to see hereafter, increases his vital capacity and vital duration. The man merely savage sinks, in regard to duration of life, to the level of the inferior animals, with which he is on an equality as to size and strength ; while, on the other hand, the weakest man, by this spiritual subsistence, can often prolong his life far beyond that of the strongest animal.

From the same principles we can resolve also the second problem : *How comes it that among men, whose duration of life so far exceeds that of animals, and who, as experience shows, can live to an extraordinary age, so few attain to their real term of existence, and that the greater part of them die before the time ; or, in other words, that where the longest duration is possible, there mortality is the greatest ?*

The great softness and tenderness of the organs, which render man more capable of long duration, expose his life also to more dangers, to more interruptions, to more derangements, and to more injuries.

Besides, the more points of contact he has with the whole of surrounding Nature, he is rendered the more susceptible of a multitude of prejudicial influences which



a coarser organization does not feel. The gratification of his multiplied wants multiplies his dangers.

Even the spiritual life is attended with its peculiar poisons and dangers. What knows an animal of deluded hope, disappointed ambition, slighted love, care, repentance, or despair? And how destructive and pernicious to the life of man are these poisons of the mind!

Lastly, one main point is, that man, though organized for a reasonable being, is, however, *at liberty* to use his reason or not; animals, instead of reason, have *instinct*; and, at the same time, are far more insensible and callous in regard to destructive impressions. Instinct teaches them to use that which is good for them, and to shun that which hurts them. It tells them, when they have enough, when they require rest, when they are indisposed. Instinct, without the help of regimen, secures them from intemperance and dissipation. Among men, on the other hand, everything, even what concerns medicine, is referred to reason. Man has neither instinct to guard against error, nor resolution enough to withstand it. All this ought to be supplied by reason. If that be wanting, or if he neglect to listen to its admonition, he loses his only guide, his greatest means of support; and sinks, physically, not only to the level of the brute, but even below it, because brutes are indemnified by Nature for the want of reason in regard to their vital support. Man, on the contrary, without reason, is a prey to every noxious influence, and becomes the most perishable and corruptible being under the sun. The natural want of reason is far less prejudicial to the support and duration of life than the interrupted exercise of it, where it has been bestowed by Nature. But, as Haller, with so much truth, says,—

O wretched being, to thy interest blind,  
In whom the angel and the brute are join'd!  
God gave thee reason to direct thy choice;  
Yet thou thy ear turn'st from its friendly voice.

In this lies the principal cause why among men, who in

every respect are best fitted for long life, mortality is greatest.

One need not object that this assertion is contradicted by many madmen who live to a great age. The first thing to be considered here is the species of insanity. If it be attended with rage and fury, these certainly shorten life very much; because they are accompanied, in the highest degree, with exertion of the powers and vital consumption. And the case is the same with the deepest melancholy and distress of mind, as these injure the noblest organs, and destroy the powers. But in a mean state, where reason is not entirely gone, where the disorder displays itself by incoherent ideas, and false but often very agreeable sports of the imagination, there the physical use of reason may continue, while the moral is lost. Nay, a man in this state is to be considered as one under the influence of a pleasant dream, on whom a multitude of wants, cares, disagreeable and life-shortening impressions, and even physical causes of disease, as experience shows, produce no effect; who lives happy in his self-created world; and is far less exposed to destruction and vital consumption. It is to be observed, in the last place, that when a lunatic is totally deprived of reason, those by whom he is attended and taken care of, think for him, and as it were lend him their reason. He is therefore supported by reason, whether it be his own or that of another.

## CHAPTER VIII.

Signs of long life in individuals. Sound stomach and organs of digestion. Good teeth. Well-organized breast. Heart not too irritable. Strong natural power of restoration and healing. Sufficient quantity and diffusion of the vital power. Good temperament. Faultless and well-proportioned make of body. No particular weakness of any part. Portrait of a man destined to long life.

AFTER explaining these general principles, I can now proceed to lay down the special and individual grounds of long life, which must exist in the man himself. I shall here, therefore, describe those *grand properties*, and that *frame*, which, according to experience and the foregoing observations, must be possessed by every man before he can lay claim to a long existence. This sketch may, in some measure, serve as a register of the signs of longevity.

The properties, which may be called the foundations of long life in man, are the following:—

I. Above all things, the *stomach*, and the whole *system of digestion*, must be sound and well formed. It is incredible of what importance this most powerful of all the rulers in the animal kingdom is, in the above respect; and one may justly affirm, that, without a good stomach, it is impossible to attain to a great age.\*

The stomach, in two respects, is the foundation of long

\* In a good stomach we have the secret of Thomas Parr's great age; in the report of his examination after death, it is stated that "his viscera were sound and strong, especially his stomach: and it was observed of him that he used to eat often, both by night and by day, taking up with old cheese, milk, coarse bread, small beer, and whey; and what is most remarkable, he ate at midnight, a little before he died."—EDITOR.

life. First, as it is the principal and most important organ of the restoration of our nature; the door through which everything that is to form a part of us must enter; and the first vessel, on the good or bad condition of which, not only the quantity, but also the quality of the addition made to our bodies must depend. Secondly, because, by the state of the stomach, the effect even which the passions, the causes of disease, and other destructive influences, have over our bodies, is modified. "He has a good stomach," says the proverb, when one wishes to characterize a person to whom neither grief, care, nor sorrow, is prejudicial; and certainly in that expression there is a great deal of truth. All these passions must, in a particular manner, affect the stomach, and must be felt by it before they can pass into, or injure, our physical constitution. A strong robust stomach is not susceptible of any impression from them: on the other hand, a weak sensible stomach is every moment subject to some derangement in its whole frame; and, consequently, the important business of restoration is continually interrupted, and carried on in an imperfect manner. The case is the same with most of the physical causes of disease. The greater part of them make their first impression on the stomach: and, therefore, a want of digestion is the earliest symptom of illness. It is thus the first vessel by which they insinuate themselves into our bodies, and disturb the whole economy. Besides, it is a principal organ, on which the equilibrium of the nervous motions, and in particular their tendency to the periphery, depends. If it be powerful and active, morbid irritations cannot so easily fix themselves: they are removed and driven off through the skin, before they effect a real derangement of the whole system; that is to say, before they bring on disease.

A *good stomach* may be known two ways; not merely by an excellent appetite, for that may be the consequence of any stimulus; but, in particular, by an easy and perfect digestion. Whoever feels that he has a stomach, cannot have a good one. One must not be sensible that

one has eaten; must not be drowsy, dejected, or uneasy after meals; must have no phlegm in the throat in the morning; and the evacuations must be regular and well concocted.

We are taught, by experience, that all those who attained to a very great age had a good appetite, which they retained to the last.

For good digestion, *good teeth* are extremely necessary; and one, therefore, may consider them among the essential properties requisite for long life, and in two points of view. First, good and strong teeth are always a sign of a sound, strong constitution, and good juices. Those who lose their teeth early, have, in a certain measure, taken possession of the other world with a part of their bodies. Secondly, the teeth are a great help to digestion, and consequently to restoration.

II. *A well-organized breast and organs of respiration.* These may be known by a broad, full chest; the power of keeping in one's breath for a long time; a strong voice, and by being seldom subject to a cough. Breathing is one of the most incessant and necessary of the vital operations; the means of the most indispensable, spiritual restoration; and, at the same time, the cause by which the blood is continually freed from a multitude of corrupted particles. Those in whom these organs are well formed, possess the greatest assurance of longevity; and for this reason, because an important passage, by which death and the causes of destruction might insinuate themselves, is fully secured. The breast is among the principal *atria mortis*,\* one of those parts of which death first lays hold.

III. *A heart not too irritable.* We have already seen, that a principal cause of our internal consumption, or spontaneous wasting, lies in the continual circulation of the blood. He who has a hundred pulsations in a minute, must be wasted far more speedily than he who has only fifty. Those, therefore, whose pulse is always quick, and

\* Entrance halls of death.—EDITOR.



in whom every trifling agitation of the mind, or every additional drop of wine, increases the motion of the heart, are unfortunate candidates for longevity, since their whole life is a continual fever; and the prolongation of it is thereby counteracted in a double manner, partly by the speedier wasting connected with it, and partly because restoration is impeded by nothing so much as by an incessantly accelerated circulation. A certain degree of rest is absolutely necessary, that the nourishing particles may settle, and be converted into the substance of our bodies. Such people, also, will never become corpulent.

*A slow, uniform pulse* is, therefore, a strong sign of long life, and a great means to promote it.

IV. *A sufficient quantity and diffusion of the vital power.*  
*A good temperament.* Calmness, order, and harmony in all the internal operations and movements, are of the utmost importance for supporting and prolonging life; but these, in a particular manner, depend on a proper state of the general irritability and sensibility of the body; and the latter qualities must be neither too strong nor too weak, and be uniformly diffused, so that no part may have too great or too small a proportion. A certain degree of insensibility, a small mixture of phlegm, are also ingredients highly necessary for prolonging the duration of life; as they lessen, at the same time, self-consumption, favour a far more perfect restoration, and contribute most effectually to preserve our existence. A good *temperament*, therefore, may so far be the foundation of a long life. The best is the *sanguine, tempered with a little of the phlegmatic*. This produces a serene, cheerful mind, moderate passions, undaunted courage, and, in short, that state of soul which is most fitted for longevity. The cause of this disposition is generally an abundance of the vital power. And as Kant has already proved that such a mixture of temperament is the properest for attaining to moral perfection, I am of opinion that one may reckon it among the best gifts of heaven.

V. *A strong natural power of restoration and healing*

by which all those losses which we daily sustain are not only repaired, but repaired well. This depends, according to the above principles, on a good digestion, and a calm, uniform circulation of the blood. To these may be also added, a perfect and vigorous activity of the absorbing vessels (the lymphatic system), and the good condition and regular operation of the organs of secretion. The effect of the former is, that the nourishing substances pass easily into our bodies, and are enabled to reach the places of their destination; by the latter, they are completely freed from all extraneous and pernicious mixture, and enter us perfectly pure. And this properly gives an idea of the most complete restoration.

It is incredible how much this quality contributes to the support of life. In a man who possesses it, consumption may be exceedingly strong without his sustaining much loss, as it is again repaired with the utmost speed. We have, therefore, instances of men who, even amidst a life of debauchery and fatigue, became very old: and thus, for example, could a Duke de Richelieu and a Louis XV. attain to a great age.

*A strong natural power of healing* must also be united with that of restoration; or, in other words, that faculty of Nature by which it assists itself easily in cases of derangement and interruption, keeps back and removes the causes of disease, and favours the healing of wounds. There is an astonishing power of this kind in our bodies, as is shown by the example of savages, who are scarcely subject to any diseases, and among whom the most dreadful wounds heal up entirely of themselves.

VI. *An uniform and faultless conformation of the whole body.* Without uniformity of structure there can be no uniformity of powers and motion, and without these it is impossible to become old. Besides, an imperfect structure gives an easy opportunity for the rise of local diseases, which may bring on death. One will not, therefore, find that an overgrown person ever attained to a very great age.

VII. No part, no intestine must have a great degree of weakness, otherwise such a part may serve to give a ready admission to the causes of disease, to the first seeds of some disorder or derangement, and become, as it were, the *atrium mortis*. Even where the organization is very good and perfect, this may be a secret enemy, from which destruction may be afterwards conveyed to the whole body.

VIII. The *texture of the organization* must be of a mean quality; strong and durable, but not too dry or rigid. We have already seen, that, through all the classes of organized beings, too great aridity or hardness is prejudicial to the duration of life. Among men it must be so in the highest degree; because their organization, according to their destination, is the tenderest of all, and, by a superfluity of earthy particles, may be soonest rendered useless. These are injurious two ways, partly by bringing on much sooner old age, the grand enemy of life; and partly by making the finest organs of restoration much sooner unfit for discharging their functions. Hardness of organization, in order to favour long life, must not consist so much in mechanical toughness as in hardness of sensation; and must not be the property so much of a coarser texture as of the powers. The quantity of earth must be exactly so great as to give sufficient elasticity and tone; but neither so large as to prove inflexibility, nor so small as to occasion too much facility of movement; for both these are hurtful to duration of life.

Let me now be permitted to delineate the portrait of a man destined to long life. He has a proper and well-proportioned stature, without, however, being too tall. He is rather of the middle size, and somewhat thick-set. His complexion is not too florid: at any rate, too much rudeness in youth is seldom a sign of longevity. His hair approaches rather to the fair than the black; his skin is strong, but not rough. His head is not too big; he has large veins at the extremities, and his shoulders are rather round than flat. His neck is not too long; his abdomen does not project; and his hands are large, but not too

deeply cleft. His foot is rather thick than long; and his legs are firm and round. He has also a broad arched chest; a strong voice, and the faculty of retaining his breath for a long time without difficulty. In general, there is a complete harmony in all his parts. His senses are good, but not too delicate; his pulse is slow and regular.

His stomach is excellent, his appetite good, and his digestion easy. The joys of the table are to him of importance; they tune his mind to serenity, and his soul partakes in the pleasure which they communicate. He does not eat merely for the sake of eating; but each meal is an hour of daily festivity; a kind of delight attended with this advantage, in regard to others, that it does not make him poorer, but richer. He eats slowly, and has not too much thirst. Too great thirst is always a sign of rapid self-consumption.

In general, he is serene, loquacious, active, susceptible of joy, love, and hope; but insensible to the impressions of hatred, anger, and avarice. His passions never become too violent or destructive. If he ever gives way to anger, he experiences rather an useful glow of warmth, an artificial and gentle fever without an overflowing of the bile. He is fond also of employment, particularly calm meditation and agreeable speculations, is an optimist, a friend to nature and domestic felicity, has no thirst after honours or riches, and banishes all thoughts of to-morrow.

## CHAPTER IX.

Examinations of various new methods for prolonging life. By vital elixirs. Gold tinctures and wonder-working essences. By hardening the organs. By rest and suspending for a time vital activity. By guarding against consumption, and the external causes of disease. By fast living. Account of the only methods possible by which life can be prolonged. Proper union of the four principal indications. Increasing the vital power. Strengthening the organs. Moderating vital consumption. Favouring restoration. Modification of these methods, according to difference of constitution, temperament, age, and climate.

VARIOUS are the methods and plans which have been proposed for the prolongation of life. The old superstitious, astrological, and fantastic methods we have already examined and appreciated; but there are others, more modern, which appear to be founded on juster principles of life and vital duration, and which still deserve some inquiry before we proceed to establish that which alone is possible.

I think I have sufficiently proved, that the prolongation of life is possible, four different ways :

- 1st. *By increasing the vital power itself.*
- 2nd. *By hardening the organs.*
- 3rd. *By retarding vital consumption.*
- 4th. *By facilitating and assisting restoration.*

On each of these ideas have been founded plans and methods, which in part are very plausible, and which have been much commended; but they are all deficient, chiefly in this, that they regard only one object, and neglect the rest.

Let us, therefore, examine and appreciate some of the principal.



On the first idea, that of *increasing the quantity of the vital power*, has been, in particular, founded, the method of those who prepare and who use gold-tinctures, astralish salts, the philosopher's stone, and elixirs of life. Electricity even, and animal magnetism, belong in part to this class. All the Adepts, Rosierueians, and Consorts, and a multitude of people sensible in other respects, are fully convinced that their first matter can not only convert the rest of the metals into gold, but continually supply the lamp of life with new oil. A man, therefore, needs only take daily a small quantity of such tinctures to recruit the vital power; and thus, according to their theory, we can never be exposed to a want or a total loss of it. On this is founded the history of the celebrated *Gualdus*, who by these helps lived 300 years, and, as some firmly believe, is alive still.

Those, however, who place confidence in these helps are miserably deceived. The use of such medicines, which are all hot and stimulating, increases naturally vital sensation; and such people consider increase of vital sensation as a real increase of the vital power, without reflecting that a continual increase of the former is, by irritation, the surest means of shortening life, and in the following manner:—

1st. These, in part, spirituous medicines act as strong stimulants, increase the internal motion and intensive life, consequently the self-consumption, and occasion a more rapid wasting of the organs. Such is the case not only with the coarser, but also with the more refined, substances of this kind. Even electricity, magnetism, and the inspiring dephlogisticated air (oxygen gas), which one certainly might believe to be the gentlest method of instilling vital power, increase self-consumption in a high degree. This may be very clearly perceived in asthmatics, who are made to inspire such air. Their vital sensation is thereby much exalted, but they die sooner.

2nd. These stimulating medicines, as they exalt vital sensation and also sensibility, expose one more to exertion of the powers; to enjoyment, and to sensual gratifications,

which some, however, particularly recommend; and by these means increase self-consumption.

3rd. They contract and desiccate, consequently make the finer organs much sooner unfit for use, and bring on premature old age, which they ought rather to keep off.

And even supposing that our vital sensation required to be so much exalted, neither alembics nor crucibles are necessary for that purpose. Nature herself has provided for us that most excellent spirit, *wine*, which excels all those prepared by the art of man. If there be anything in the world which one can call the *prima materia*, that contains the spirit of the earth in an incorporated form, it is certainly this noble production; and yet we find that too liberal a use of it occasions a speedier consumption, brings on old age, and evidently shortens the duration of life.

But it is, indeed, foolish to endeavour to accumulate the vital power in a concentrated form within the body, and then to imagine that one has accomplished something great. Are opportunities of doing this, wanting? It abounds in everything near and around us. All the nourishment we take, each mouthful of air that we breathe, is filled with it. The principal point is to preserve our organs in a state capable of absorbing, receiving, and appropriating it. Let a lifeless body be filled ever so much with vital drops, it will not begin to revive, because it has no longer organs to appropriate them. It is not the want of vital accession, but of vital capacity, which in the end makes men unfit to live longer. But here Nature herself is our guardian; and, in this respect, all vital drops are unnecessary.

On the second idea, *strengthening the organs*, a very favourite system, that of *hardening*, has also been founded. It is therefore believed that the more the organs are hardened, the longer they must naturally withstand consumption and destruction.

But we have already seen what a great difference there is between the mechanism of a thing and its vital dura-

tion; and that a certain degree only of solidity is favourable to the latter, and that too much is highly prejudicial. The essential character of life consists in the uninterrupted and free activity of all the organs, and of the circulation of the juices; and what can be more destructive to these, and consequently to the duration of life, than too great hardness and rigidity? Fish certainly have the softest and most watery flesh; yet they far exceed, in vital duration, stronger and more solid animals.

The favourite method of hardening, which consists in endeavouring, by the continued use of the cold bath; keeping the body exposed, almost naked, to the keenest air, and the most fatiguing exercise, to make one's self strong and indestructible, produces no other effect than that our organs become drier, tougher and more rigid, consequently much sooner unfit for use; and therefore, instead of prolonging life, we bring on premature old age and speedier dissolution.

There is, however, some truth, upon the whole, in this method; and it has proved unsuccessful, because people united with it false ideas, and carried it too far. It is not so much a hardening of the vessels as of the feeling, that can contribute to the prolongation of life. When one, therefore, employs the hardening method so far as to make the vessels strong, but not hard or stiff, so that their too great irritability, a principal cause of speedy wasting, is blunted or removed, and the body rendered thereby, at the same time, less susceptible of destructive influences, it may certainly, in that case, be of some service in lengthening our existence.

The third idea, that of *retarding vital consumption*, is highly captivating; and has been adopted, in particular, with great satisfaction, but very improperly employed, by those who are naturally much inclined to indolence and ease. To waste the body by labour and exertion is, to such people, unpleasant in itself; they are rejoiced, therefore, to find it not only disagreeable, but also prejudicial, and to have, in *indolence*, a grand secret for prolonging

life, superior to all the arcana of *Cagliostro* and *St. Germain*.

Some have gone even still farther, and in particular *Maupertuis*, who conceived it might be possible, by a complete suspension of vital activity, or an artificial apparent death, to check self-consumption entirely, and by such pauses, to preserve life for perhaps several centuries. He supported his proposition on the life of a chicken in the egg, and of insects in their state of nymph and chrysalis, which, by the help of cold and other means, whereby the animal is kept longer in its deathlike sleep, can actually be prolonged. According then to these principles, nothing is necessary but to acquire the art of half-killing one. The same idea occurred even to the great Franklin. While in France, he received from America a quantity of Madeira wine, which had been bottled in Virginia. In some of the bottles he found a few dead flies, which he exposed to the warm sun, in the month of July; and in less than three hours these apparently dead animals recovered life, which had been so long suspended. At first they appeared as if convulsed; they then raised themselves on their legs, washed their eyes with their fore feet, dressed their wings with those behind, and began in a little time to fly about. This acute philosopher proposed, therefore, the following question:—"Since, by such a complete suspension of all internal as well as external consumption, it is possible to produce a pause of life, and at the same time to preserve the vital principle, might not such a process be employed in regard to man? And if that be the case," adds he, like a true patriot, "I can imagine no greater pleasure than to cause myself to be immersed along with a few good friends in Madeira wine, and to be again called to life at the end of fifty or more years, by the genial solar rays of my native country, only that I may see what improvement the state has made, and what changes time has brought along with it."

This proposal, however, vanishes again into nothing

when we consider the real essence and object of human life. What is meant by the life of man? Not, indeed, mere eating, drinking, and sleeping, else it would agree perfectly with the life of a swine, to which *Cicero* could give no other name than a preventive of corruption. The life of man has a higher destination—action, business, and enjoyment. It is not enough that it be present, it must expand, and bring to perfection those divine seeds which exist within him; it must give happiness to himself and to others. Man must not merely fill up a gap in the creation, he must be the lord, the ruler, and the benefactor of it. Can one say of a man that *he lives*, when he spins out life amidst sleep, indolence, or apparent death? But, what is still more, we find here also a new proof in how inseparable a manner the moral object is interwoven with his physical appointment and destination, and how promoting the one conduces to improve the other. Such an unmanly life, as it may be properly called, would contribute directly not to prolong, but to shorten human existence, and in two ways:—

1st. Human life is composed of so tender and delicate organs that they very readily become unfit for use by rest and inactivity. It is only action and exercise which make them useful and durable. Rest and want of exercise are their most deadly poison.

2nd. We have already seen that not merely lessening consumption, but promoting restoration also, in a sufficient degree, is necessary for the prolongation of life. But two operations are here requisite: first, perfect assimilation of what is useful; and secondly, excretion of what is hurtful. The latter can never take place without proper activity and motion. What would be the consequence of a prolongation of life by means of rest and indolence? The body would be consumed very little or not at all, and yet restoration would be carried on. A most destructive plethora must thence arise, because the body always receives and never throws off. And, what is still worse, universal corruption, with its train of evils, acrid humours,



disease, &c., must gain the upperhand, as the secretion of what is prejudicial has been stopped. It is very natural, therefore, to suppose that such a body would be much sooner destroyed, as experience teaches us.

3rd. With regard to the prolongation of life by a suspension of the vital activity during a temporal state of apparent death, I shall, in the last place, observe, that this idea has been founded on the example of insects, tortoises, and other animals, which, as we have before seen, can, by such a deathlike sleep, be preserved a hundred years and more, and consequently far beyond the natural term of their existence.

But, in making such proposals, people do not reflect that all those experiments were tried upon very imperfect animals, among which the transition from their natural half-animated state to actual torpor is much less abrupt than it would be among men, who possess the highest degree of vital perfection. And one, in particular, must here observe the important difference made by the business of respiration. All these animals have naturally less need of breathing; and warmth is less necessary to them in order to retain life. Man, on the other hand, requires, for the preservation of his life, a continual accession of heat and spiritual powers; in short, of the *pabulum vitæ*,\* which exists in the atmosphere. Such a total suspension of breathing would, by an entire loss of internal heat, soon become mortal. The more perfect agency of the soul is so interwoven with the organization of man, that its influence could not be stopped so long without causing the death and destruction of the more delicate organs which belong to it.

Others have attempted to prolong life by endeavouring to avoid or remove the causes of disease, such as heat and cold, certain kinds of food and drink, &c. But this method is attended with one disadvantage, which is, that we are not able to guard against all these evils; and that we are, therefore, rendered much more sensible of those which

\* Food of life.—EDITOR.

affect us. The preventing of consumption externally may also be here included. In warm countries, where the heat of the atmosphere keeps the skin always open, and makes the evaporation of the component parts of our bodies far more constant, people find some benefit from rubbing the skin continually with ointments and oil, which stop up the pores, and prevent the more watery and volatile particles from flying off in perspiration. By this process one experiences a real sensation of strengthening; and, in such climates, it appears to be necessary to check too speedy consumption by profuse evaporation. But it is certain that it is in warm climates only that it can be employed. In our climate, where the atmosphere itself acts as a medium to shut up the pores of the skin, we have more need of promoting perspiration than of preventing it.

I must now say a few words respecting an entirely new experiment for prolonging vital existence, which consists merely in *increasing intensive life*. On this principle the duration of life is determined, not by number of days, but by the sum of its use or enjoyment; and it is believed that if one, within a certain period, has had twice as much action and enjoyment as another, he has lived as much as the other in double the time. However much I respect this method in itself, if it consist in laudable exertion, and be the consequence of a mind fertile in action; and though I am fully convinced that, considering the uncertainty of our life, it presents an idea highly captivating; I must confess, that it will never obtain its object, and that the principle of it appears to be altogether false. As this opinion has found so many advocates, I hope I shall be permitted to analyze it a little more accurately, and to explain the grounds of my assertion.

All the operations of nature require not only energy or intensive life, but also extension or time. Let fruit receive twice as much heat and nourishment as it has in its natural state, and in half the time it will attain to apparent ripeness; but certainly not to that degree of perfection which

the same fruit acquires in its natural state, with half the intensive activity, in double the time.

The case is the same with the life of man. We must consider it as a whole compounded of various effects; as a grand ripening process, the object of which is to give the utmost expansion and perfection possible to human nature, and to make it fill up that point which it holds in the creation. Now ripening and maturity are the produce only of time and experience; and it is, therefore, impossible that a man who has lived thirty years, though in that time his action and labour may have been doubled, should have attained to the same perfection and maturity that are acquired in a period of sixty years. Besides, he was perhaps destined to be useful in the course of his life to two or three generations; but his prematurity hurries him off before he has seen the end of the first. He accomplishes, then, neither in regard to himself nor to others, the object and destination of complete life; interrupts the course of his days; and remains a more refined suicide.

In a still worse point of view appear those who endeavour to prolong life by concentrating its enjoyments. By these means they may be wasted much sooner; and what is worst of all, they are often punished for their folly, because they must lead a life merely intensive without any extension; that is, they must become a burden to themselves and to others, or rather they exist longer than they live.

The true art of prolonging human life consists in uniting properly, and employing, the before-mentioned four principles, or *indications*, as they are termed by physicians; but in such a manner that none of them be sacrificed to the rest, and that one never forget that the question is concerning the life of man, which, to deserve that name, must consist not merely in existing, but in business and enjoyment, and in fulfilling the end of his destination. I shall here take a short view of the whole method.

I. *The sum or fund of the vital power must be suffi-*

*ciently supplied and nourished*; yet never to such a degree as to occasion too violent exertion of it, but only so far as may be necessary for it to perform the external and internal functions with proper ease, strength, and duration, and to give the component parts and juices that organic character which is requisite for their destination, and for guarding against chemical corruption. This may be done with the greatest certainty,—

1st. By sound and powerful generation.

2nd. By pure and wholesome vital nourishment or accession from without; also pure atmospheric air; and good, fresh, well-digested food and drink.

3rd. By a sound and useful state of those organs by which everything added to us from without must be assimilated before it can do us good. These essential organs are the *lungs, stomach, and skin*; on the preserving of which in a sound state, vital nourishment depends in a very particular manner.

4th. By an uniform diffusion of the power throughout the whole body. Every part, every intestine, every point of our bodies, must obtain such a quantity of the vital power as may be necessary to enable it to discharge its functions properly. Does any part acquire too little, a weakness of it is the consequence; if it acquire too much, the consequences are too violent motion, irritation, accumulations of it; and then that harmony, the grand pillar of sound life, is, at any rate, always destroyed. This uniform distribution of the power may be promoted, in particular, by the uniform use and exercise of each part and each organ of the body; by bodily motion; proper gymnastic exercises; the tepid bath, and friction.

II. *A sufficient degree of solidity or hardness must be given to the organs or corporeal matter*; but not such as to render them actually stiff and rigid, which, instead of being beneficial to the body, would be hurtful to it.

The hardness to which I here allude is of two kinds: increased binding and cohesion of the component parts, as well as physical solidity of the vessels; and next, hard-

ening the sensation against noxious and morbid impressions.

Sufficient solidity or cohesion of the vessels, which physicians call *tone*, acts in the following manner, in regard to the prolongation of life :—

First, as the cohesion of our component parts is thereby increased, they cannot be so speedily wasted, destroyed, and separated by the vital process; consequently the change of the component parts is not so rapid: it is not necessary that they should be so often renewed; and the whole intensive life is more slow, which is always an advantage in regard to its extension and duration.—For the better illustration of this subject, I shall here only compare the life of a child with that of a man. In the former, the power of cohesion, the solidity of the vessels are much less; the connexion of the component parts is weaker and more lax, it wastes away therefore much speedier; the change of its component parts is more rapid; it must eat more, and much oftener; it must sleep longer, and more frequently, to renew what has been lost; and the blood must circulate with far greater velocity; in a word, its intensive life and self-consumption are much stronger than in a man who has vessels more solid.

Secondly, as the organs are thereby, in reality, first strengthened. The vital power alone supplies no strength. To produce what we call *strength* of the organs, and also of the whole system, a sufficient degree of the simple power of cohesion must be combined with the vital power.—This likewise will appear in the clearest manner, from the comparison of a child with a man. A child is far more abundant in vital power, irritability, tendency to growth, and the power of reproduction, than a man; yet this body, so rich in life, has less *strength* than that of a man, merely because the cohesion of the vessels in the child is weaker and more loose.

Lastly, because the too great morbid or irregular irritability, sensibility, and general delicacy of the vessels, are regulated, moderated, kept within proper bounds, and



preserved in good order, by a sufficient mixture of the power of cohesion ; and by these means the too strong irritation and consumption of the power by life is lessened ; the extension and duration of life are, consequently, increased ; and this advantage also is gained, that external noxious causes of irritation act less rapidly, and with less violence.

By a stronger cohesion, the capacity of the matter for receiving vital power seems also to be heightened ; at any rate, a stronger connexion of the vital power with the matter is effected.

The means by which this increased solidity and cohesion of the vessels can be produced, are as follows :—

1st. Exercise, and the use of the muscular powers and vessels, both voluntary, by voluntary muscular motion, as well as involuntary, for example, of the stomach and intestines by suitable stimulants, such as food somewhat solid or hard ; and of the bloodvessels, by somewhat stimulating medicines. On each movement of a vessel, it contracts ; that is to say, its component parts approach each other ; and if this be done often, its cohesion or tone will be increased. One only must be extremely cautious not to occasion too strong an irritation, else consumption might be too much increased, and the consequences become dangerous.

2nd. The use of gelatinous, corroborating nourishment, impregnated with ferruginous particles, which increase this power ; and to avoid too many watery substances, which might lessen it.

3rd. To promote moderate perspiration by friction, motion, &c.

4th. A cool temperature of the atmosphere, and of the whole system, a point of the utmost importance. Though cold is not a positive strengthener of the vital power, yet it increases and strengthens the weak cohesive power or tone ; corrects too strong exertion of the vital power, as well as prevents it from being exhausted ; and, in this

manner, can be a negative strengthener of the vital power itself. Warmth, on the other hand, weakens, partly by relaxing the cohesion, and partly by exhausting the vital power.

I must, however, repeat, in regard to all these means, cold, strong substantial nourishment, motion, &c., that one must not carry them too far, lest, instead of the requisite solidity, too great stiffness or rigidity of the vessels should be produced.

The sensation will be best hardened against the causes of disease, if one accustoms oneself to such impressions, and to sudden changes.

III. *The vital consumption must be so lessened, or moderated, that it may not be attended with too speedy wasting of the powers and the organs.*

The whole vital operation, as has been already shown, consists in action, exertion of the vital power; and is consequently connected, in an inseparable manner, with consumption and wasting of that power. This is the case, not only in regard to the voluntary, but also the involuntary, functions; not only in the external, but also the internal, vital operations; for they are supported by continual irritation and reaction. Neither of these, therefore, must be overstrained, if we are desirous of preventing consumption.

Among these I reckon, in a particular manner, the following irritations and exertions of power:—

1st. Straining the system of the heart and blood, with too great quickening of the circulation; that is, by too stimulating, hot nourishment, affections, and feverish disorders. Great wine and brandy drinkers, as well as passionate people, have a quick, accelerated pulse, and keep themselves in an incessant artificial fever, by which they are as much wasted and consumed as they would be by a real fever.

2nd. Too strong or continued straining of the powers of thought; by which, not only the vital power is exhausted,

but the stomach and system of digestion are injured, and consequently the most important means of restoration are weakened.

3rd. Too abundant and too strong irritation and gratification of the animal passions. These tend as much to hasten vital consumption, as straining the powers of thought.

4th. Too violent and too long continued muscular motion. Very great excess, however, is necessary before this can be hurtful.

5th. All strong or long continued excretions, such as perspiration, diarrhoea, catarrh, cough, loss of blood, &c. These exhaust not only the power but also the matter, and tend to corrupt the quality of the latter.

6th. All too violent or too long continued causes of irritation acting upon us, by which the power is always exhausted. The more irritable a life is, the quicker it will pass away. To these belong too strong or too incessant irritation of the organs of the mind and sensation; passions, excess in wine, brandy, spiceries, and seasoning of food. Frequent overloading the stomach may be included in the same class; especially as it for the most part renders necessary the use of evacuants and purgatives, which, as they weaken, are also prejudicial.

7th. Diseases with highly increased irritation, particularly such as are feverish.

8th. Heat, when it acts upon us too incessantly and with too much strength. Keeping the body too warm, therefore, from infancy, is one of the greatest means to hasten consumption, and to shorten the duration of life.

9th. In the last place, too great a degree of irritability and sensibility in the vessels deserves also to be inserted in this rubric. The greater these are, the easier can any stimulus, even the smallest, excite violent irritation, exertion of power, and consequently occasion a waste of that power. A man with this faulty constitution is sensible of a great many impressions which have no effect on common men, and is doubly affected even by the most usual

accidents of life. His intensive life, of course, is infinitely stronger ; but his vital consumption must be greatly accelerated. Everything, therefore, which can increase irritability, either moral or physical, may be reckoned to belong to those means which hasten consumption.

IV. *Restoration of the lost powers and matter must be effected easily and completely.* For this purpose the following things are necessary :—

1st. Soundness, vigour, and activity of those organs by which the restorative particles must pass into our bodies. This process is, in part, continual and permanent, as through the lungs ; and partly periodical, as through the stomach. To these organs belong the lungs, the skin, the stomach, and the intestines. That restoration may be performed well, these parts must be thoroughly sound, fit for use, and active. They are consequently of the utmost importance in prolonging life.

2nd. Soundness, activity, and vigour of the innumerable vessels, by which the component parts received into our bodies must be assimilated, rendered homogeneous, be brought to perfection, and ennobled. This is first, and in a particular manner the function of the absorbing or lacteal system, with its multitude of glands ; and secondly, of circulation, or the system of the blood, by which organic ennobling is completed. I consider the absorbing system, therefore, as one of the grand means of restoration. In this respect we must, above all things, direct our attention to infancy ; for the first nourishment in the tenderest state of childhood, the treatment, during the first year of life, determine, for the most part, the condition of this system, as it too often happens that it is destroyed in the beginning, by weak, corrupted, viscid nourishment, and impurities ; and an essential foundation is thus laid for a short life.

3rd. A sound state of the nourishment and matter from which we are restored. Our food and drink must be pure, that is, free from corrupted particles ; abundant in nutritive principles ; stimulating in a certain degree, for that quality is necessary to promote proper digestion and

the whole vital operation, but combined, at the same time, with a sufficient quantity of water or of fluids. The last is an important circumstance, but often neglected. Water, if it be not nourishment of itself, (though this, by the instance of fishes, worms, &c., who may be fed for a long time with water alone, seems highly probable,) is at any rate indispensably necessary for the business of restoration and nourishment; first, because it must be the vehicle for the proper nutritive substances, in order that they may be sufficiently diffused from the intestines to every point of the body; and secondly, because this vehicle is absolutely necessary to produce sufficient secretion and evacuation of what is corrupted, and consequently for the purification of the body.

4th. A healthful and proper state of the atmosphere in which and on which we live. The air is our peculiar element; and, in two points of view, an important medium of restoration. First, because it communicates to us two of the most spiritual and most necessary component parts of life, oxygen and heat; and secondly, because it is the most important vehicle for attracting from us and absorbing our component particles which have become corrupted. It is the principal medium for this continual exchange of the finer component parts. The far most considerable and important of our excretions are gaseous; that is to say, the matter must be converted into vapour in order to be expelled. To these belong all excretions of the superficies of our bodies, the skin, and the lungs. This evaporation depends not merely on the power and activity of the vessels of respiration, but on the quality of the air which they draw in. The more it is already loaded with component parts, the less new substance can it receive; and, therefore, moist air checks perspiration. From these principles we may deduce the following conclusions:—The atmosphere in which we live must contain a sufficient quantity of vital air, but not too much, else it might stimulate too violently and hasten vital consumption. It must likewise contain as few foreign component parts dis-



solved in it as possible: it must also be neither moist, nor rendered impure by earthy, vegetable, or animal particles.\* Its temperature must be neither too warm nor too cold; for, in the former case, it exhausts and weakens the power. In the latter makes the vessels too stiff and rigid: and it must neither in its temperature, mixture, nor pressure, be subject to too rapid changes; for it is a law, fully confirmed by experience, that uniformity in the atmosphere and climate is uncommonly favourable to long life.

5th. A free passage and active organs to promote secretion and evacuation of the corrupted component particles. Our life consists of a continual change of component parts. Were not those which have been exhausted and rendered useless continually separated and expelled, it would be impossible that we could appropriate new ones in sufficient quantity; and, what is still worse, the new addition, by being mixed with those particles kept back, would itself acquire the character of corruption. Hence, the so-called acridity, viscosity, impurity, and putrefaction of the juices, or rather of the whole matter of the body. Restoration, therefore, is by bad secretion prevented two ways; partly in the quantity, and partly in the quality. The organs on which this secretion and purifying of the body principally depend are the *skin, the kidneys, the liver, the intestines, and the lungs*. Of these the first is the most important, as it is calculated that two-thirds of the component parts which have been used, evaporate by the insensible perspiration of the skin.

6th. To stimulate the senses in an agreeable manner, and with moderation. Man, in consequence of the superiority of his organization, as has been already shown, and of his higher physical perfection, is susceptible of

\* In defining corrupted air an accurate distinction should be made between *impure* air and *saturated* air, which in general are confounded. Corruption of the air may consist either in too small a quantity of oxygen gas, or in the chemical mixture; and air so corrupted may be called *impure* air, in opposition to *pure* vital air; or it may be corrupted by foreign component parts received into it, and then it is called *saturated*.

more refined as well as more exalted impressions ; and, consequently, they must have a greater influence on the physical state of his life than on animals. By these means there is opened for him a new source of restoration, which is denied to animals ; the enjoyment and stimulus of sensual pleasure, when not carried to too great a length.

7th. Putting the mind in an agreeable frame ; joyful and moderate affections ; a succession of new, grand ideas ; creating, combining, and varying them. These more exalted pleasures, exclusively peculiar to man, belong to this catalogue of the means which contribute to prolong his existence. Hope, love, and joy are therefore happy affections ; and there is nothing which tends with so much certainty and so generally to preserve life and health as *cheerfulness* and *serenity* of mind. Such a disposition keeps the vital power in a proper uniform state, promotes circulation and digestion, and assists, in a very powerful manner, the function of insensible perspiration. Happy, therefore, even in a physical point of view, is that man on whom Heaven has bestowed a contented and serene mind, or who, by improving and cultivating his moral faculties, has been able to procure that blessing. He has within himself the noblest and purest balsam of life.

The principles here laid down contain the fundamental rules on which every rational general plan for prolonging life must be founded. But what is necessary in regard to every dietetic and medicinal precept is necessary here, that, in applying them, regard must be had to special cases ; and that, therefore, they must be more accurately modified and determined.

The following circumstances, in particular, are to be attended to in the application of them :

*Difference of constitution in the subjects*, in regard to their simple component parts and vessels. The drier, the harder, and more rigid the state of the body naturally is, the less need there will be for employing the means of the

second indication, that is, a proper hardening; but the more relaxed the vessels are by nature, the contrary must be the case.

Further, the different innate *temperaments*, under which I comprehend the different degrees of irritability, and their relation to the powers of the soul. The more a subject inclines to the *phlegmatic* temperament, the more and the stronger irritants may be employed. A degree of irritation, which in a sanguine temperament would waste and exhaust, is here beneficial; necessary to promote a sufficient degree of vital operation, and a means of restoration. The case is the same with the *melancholic* temperament: it requires more irritation, but variegated, of a pleasant nature, and not too violent. The more the *sanguine* temperament prevails, the more cautiously and moderately must all stimulants as well physical as moral be employed; and in this respect, the *choleric*, where the smallest stimulus may often produce the most violent exertion and rapid wasting, requires the greatest attention.

*The periods of life.*—Children and young people have far more vital power and irritability; their structure is less solid; and the change of their component parts is more rapid. Much less irritation must, therefore, be here given, because a small irritation excites strong reaction. More regard must be proportionally paid to restoration and hardening. In old age, on the other hand, everything called irritation may be employed in a stronger degree. What in infancy would be consumption, is here restoration. Milk is wine for children; wine is milk for old people. Old age requires, therefore, on account of the great rigidity connected with it, not an increase of that quality by the second indication, but a lessening of it by means of emollients and moistening things, meat-broths, strong soups, and the tepid bath.

Lastly,—*Climate*, also, makes some difference. The more southern it is, the greater is the irritability; the stronger continual irritation is, the more rapid will the

stream of life flow, and the shorter will be its duration. Great attention is here necessary that this exhausting of the power, by too strong irritation, may not be accelerated. In a northern climate, on the other hand, where the temperature being cooler concentrates the power more, and keeps it together, this is much less to be apprehended.

# ART OF PROLONGING LIFE.

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## PART THE SECOND.

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I NOW proceed to the most important part of this Treatise, the Practical Art of prolonging Life; and I can now make known with confidence, and on good grounds, those means by which alone prolongation of it is possible. If they are not so specious, so boasting, and so mysterious as those commonly recommended, they have this advantage, that they may be everywhere found without expense, nay, that they in part lie within ourselves; that they are perfectly consistent with reason, as well as experience; and that they prolong, not merely life, but also the enjoyment of it. In a word, according to my idea, they deserve the name of universal remedies, much more than all the panaceas of quackery and imposture.

We are continually surrounded by the friends and the enemies of life. He who keeps company with its friends, will become old; but he who prefers its enemies, will shorten his existence. It might be expected of every prudent man, that he would prefer the former, and be always on his guard against the latter; but it is an unfortunate circumstance that these enemies of life are not all public and known. They, in part, carry on their attacks secretly and imperceptibly; so that some of them assume the mask of life's best friends. It is, therefore, difficult to discover them; and some we even harbour within our own bosoms.

The principal part of this Art, then, will consist in being able to distinguish our friends from our enemies,



and in learning to guard against the latter. In other words, the Art of prolonging Life may be divided into two parts :

- I. Guarding against the enemies of life, and those means which shorten it.
  - II. The knowledge and use of those means which tend to prolong it.
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### MEANS WHICH SHORTEN LIFE.

ACCORDING to the principles before laid down, the only grounds on which the duration of life depends, it will not be difficult to determine in how many different ways it may be shortened.

- 1st. Everything must shorten it which lessens the sum of the vital power ;
- 2nd. Everything that takes from the organs of life their duration and renders them unfit for use ;
- 3rd. Everything that hastens vital consumption ;
- 4th. And everything that prevents restoration.

Everything that shortens life may be comprehended in these four classes; and we have now a standard by which the greater or less mischief, occasioned by their influence, can be determined and appreciated. The more these four properties are in anything united, the more dangerous and hostile will it be to our vital duration; and the fewer it contains, it will be less so. Nay, there are mixed substances which present as it were two sides, one friendly, and another hostile; that is to say, which possess one of the above properties, but at the same time are more favourable and beneficial to us than hurtful. These may form one peculiar class, but we shall here, according to

their prevailing quality, assign them a place, either among those things which are friendly, or those which are hostile.

Between those things which shorten life, there is a difference still more important. Some act slowly, successively, and often very imperceptibly. Others, on the contrary, violently as well as suddenly; and these may be rather named *the destroyers of life*. To these belong certain diseases, and the various kinds of violent death, as they are properly called. The latter, in general, are much more dreaded than the former, because their effects are more perceptible and more terrible: but, I can assure my readers, that they are at bottom much less dangerous than these secret enemies; for they are so open that people can be much sooner on their guard against them than against the former, which carry on their destructive approaches in private, and daily steal from us some part of life without our perceiving it, though the loss in the end may amount to a sum truly alarming.

I must here make one melancholy remark, which is, that the enemies of our life have, in modern times, dreadfully increased; and that the degree of civilization, luxury, refinement, and deviation from nature, in which we at present live, by so highly exalting our intensive life, tends also to shorten, in the same proportion, our existence. We shall find, on close examination, that men appear, as it were, to have anxiously studied how they might deprive each other of life secretly and imperceptibly, and often in the most ingenious manner possible. Much more precaution and attention are, therefore, now necessary in order to secure ourselves from danger.

## CHAPTER I.

## Delicate nursing and treatment in infancy.

THERE is no surer method of rendering the vital thread of a being from its origin short and perishable, than by giving it, during the first years of life, which may be considered as a continued generation and expausion, a very warm, tender, and delicate education; that is, by guarding it from every breath of cool air; burying it for at least a year among pillows and blankets, and keeping it like a chicken in a real state of hatching; not omitting, at the same time, to stuff it immoderately with food; and, by coffee, chocolate, wine, spice, and such like things, (which for children are nothing else than poison,) to irritate it beyond measure, and to render its whole vital activity too strong and violent. By these means its internal consumption is from its birth so accelerated, its intensive life is so early exalted, and its organs are rendered so weak, tender, and sensible, that one may assert that, through two years treatment of this kind, an innate vital capacity of sixty years may be reduced one half; nay, as experience unfortunately shows, to much less, without reckoning those evil accidents and diseases which may besides be the consequence. The premature expansion of our organs and powers is by nothing so much hastened as by such a forced education; and we have before proved what an intimate connexion there is between rapid or slow expansion, and a longer and shorter duration of life in general. Speedy ripening carries always along with it\*

\* One of the most remarkable instances of the prematurity of nature was Louis II., King of Hungary. He was born so long before the time that he had no skin. In his second year he was crowned; in his tenth he succeeded; in his fourteenth he had a complete beard; in his fifteenth he married; in his eighteenth he had gray hair, and in his twentieth he died.

peedy destruction. This, certainly, is one great cause of the dreadful mortality which prevails among children. But men everlook those causes which lie nearest to them, and assume rather the most absurd, in order that their minds may be at rest, and that they may have as little to do as possible.

## CHAPTER II.

## Physical excess in youth.

“As youth is the period of growth, of forming and collecting the powers of the future man, every kind of excess calculated to weaken or exhaust the vital powers should be carefully guarded against. There are certain active properties which belong to this period, such as muscular motion, which can hardly be carried beyond the bounds of health. But the excesses most to be dreaded are those which spring from a too early anticipation of the future man, in which the imagination and the feelings play a conspicuous part. Youth, it cannot be too often repeated, is the time for storing strength, both physical and moral; and every act which can in any way impede or frustrate this all-wise intention of Nature, will tend to lay the foundation of a weak and imperfect body, and shorten the days of its possessor. Among the passions of the future man, which, at this period, should be strictly restrained, is that of physical love; for none wars so completely against the principles which have been already laid down as the most conducive to long life; no excess so thoroughly lessens the sum of the vital power; none so much weakens and softens the organs of life; none is more active in hastening vital consumption; and none so totally prohibits restoration.

I might, if it were necessary, draw a painful, nay, a frightful picture, of the results of these melancholy excesses; but I refrain, in the hope that this simple caution will be sufficient. To my youthful readers I will simply say, *Be wise in time*. Experience may appear a harsh, but, nevertheless, she is a just monitor.”—EDITOR.



## CHAPTER III.

## Overstrained exertion of the mental faculties.

MENTAL as well as bodily excess, is attended with destructive consequences; and it is worthy of remark, that too great exertion of the mental faculties, and the waste of the vital power connected with it, produce on the health and vital duration almost the same effects as a waste of the physical powers—loss of the power of digestion, depression, dejection, weakness of the nerves, consumption, and premature death.

Much, however, depends here on the difference of structure and constitution; and those who have naturally a stronger and more active organization of soul, must suffer less from such exertion than those who are destitute of that advantage. Those, therefore, are most affected by it, who, with a moderate structure of mind, attempt to force it beyond its powers; and that excessive mental exertion which we make involuntarily, and without pleasure in the object of it, will hence weaken us most.

But it may here be asked, What is meant by excess in mental exertion? This, in general, is as difficult to be defined as excess in eating and drinking; because the whole depends on the difference in the capacity and state of the mental powers, and these are as different as the powers of digestion. That may be excess of mental exertion for one, which is not so for another, endowed with stronger faculties. The circumstances, also, under which that function is exercised, make a very essential difference. I shall, therefore, define more accurately what is to be understood by excess in the function of thinking.

1st. When one, while employed in abstruse thought, neglects too much the body. Every irregular exertion of our powers is hurtful; and as a man is infinitely more weakened when he exercises his thought without attending to bodily exercise, it is equally certain that those can undergo more mental labour, and with much less injury to their health, who, in the mean time, give to the body suitable and periodical exercise.

2nd. When one thinks too incessantly on the same subject. The same law prevails here as in regard to muscular motion. When one moves the arm continually in the same direction, one, in a quarter of an hour, will become more fatigued than if the limb had been moved two hours in various directions. Nothing exhausts so much as uniformity in the pursuit and employment of the mental powers; and Boerhaave tells us that after having bestowed intense study, for a few days and nights, on the same object, he fell suddenly into such a state of lassitude and relaxation, that he lay some time in an insensible and deathlike condition. A proper change of objects is, therefore, the first rule in order to study without injury to the health, and even to accomplish more work upon the whole. I am acquainted with great and intense thinkers, mathematicians, and philosophers, who, at an advanced period of life, are still happy and contented; but I know also that they have made this variety a law, and that they always divide their time between these abstract studies and reading history, agreeable poetry, travels, and works of natural history. It is of great benefit, in this respect, to unite always a practical with a speculative life.

3rd. When one employs the mind on too abstract or difficult subjects; as, for example, problems of the higher mathematics and metaphysics. The object makes a very essential difference. The more abstract it is, and the more it obliges one to disengage one's self from the sensual world, and, as it were, to insulate the mind separated

from the body, the most unnatural state, without doubt, that can possibly be, the more weakening and overstraining is its effect. Half an hour of such abstraction exhausts more than a whole day employed in translation. But here, also, a great deal is relative. Many are born for such labour, and have those powers and that frame of mind which it requires; while, on the other hand, many are destitute of both, and yet endeavour to force them. It appears to me very singular that, when it is requisite to raise up a corporeal burden, people always first try it by their strength, to discover whether it be not too heavy for them; but in regard to a mental burden, never consult their powers to know whether they are sufficient to sustain it. How many have I seen miserable and enervated, merely because they attempted to dive to the depths of philosophy without having philosophical heads! Must every man, then, be a philosopher by profession, as seems to be the mode at present? In my opinion, a particular organization is necessary for that purpose; and it may be left to the chosen few to investigate and unfold the secrets of philosophy; as to others, let them be contented with acting and living like philosophers.

4th. I consider it also as excess, when one labours always in creating and never in enjoying what has been created by others. The labour of the mind may be divided into two parts: the *creative*, which produces of itself and gives birth to new ideas; and the *recipient*, or passive, which merely receives and enjoys foreign ideas, as, for example, by reading or hearing others. The former is by far the most exhausting; and one ought, therefore to vary them, and to enjoy them in turns.

5th. When one begins to overstrain the mind too early in infancy. At this period a small exertion is highly prejudicial. Before the age of seven, all mental labour is an unnatural state, and attended with consequences as fatal to the body as the most exhausting excess.

6th. When one studies *invita Minerva*, that is, applies

to subjects on which one labours involuntarily, and not *con amore*. The more inclination one has for any kind of mental enjoyment, exertion will be the less hurtful. More caution, therefore, is necessary in the choice of studies; and wretched must those be who neglect an object of so much importance.

7th. When one stimulates, strengthens, or prolongs mental exertion by artificial means. People employ commonly, for this purpose, wine, coffee, or snuff; and though these artificial helps of thought are in general not to be approved, because they always exhaust doubly, it must, however, be confessed, that, at those times when the labour of the mind does not depend upon the will, but on periods and hours, they cannot altogether be dispensed with; and on such occasions, a dish of coffee, a pipe of tobacco, or a pinch of snuff, may be the most sufferable. But let people be on their guard against excess; because an abuse of them must increase, in an incredible degree, the mischiefs of mental exertion.

8th. When one overstrains the mind during the time of digestion. This occasions double injury: one weakens one's self more, as more exertion is then necessary for thinking, and interrupts at the same time the important function of digestion.

9th. When one employs, in mental labour, that time which ought to be devoted to sleep; a custom highly prejudicial to life, and of which I shall speak more expressly when I come to treat on sleep.

10th. When one unites study with hurtful external circumstances; and of these there are two in particular, *sitting in a bent posture*, and *confined air*; which are often more destructive in their consequences than intense thinking itself. People, therefore, ought to accustom themselves to study lying, standing, walking, or riding on a hobby; not always in the closet, but sometimes in the open air; and they will then suffer much less from those diseases which are so incident to men of letters. The

ancient philosophers undoubtedly studied as much as the modern literati; and yet never suffered from bodily disease induced by such study. The sole cause of this was, that they meditated more, lying or walking, and in the open air; because they never drank coffee, or used tobacco; and because, at the same time that they exercised the mind, they never neglected the care and the exercise of the body.



## CHAPTER IV.

Diseases. Injudicious manner of treating them. Sudden kinds of death. Propensity to self-murder.

DREADFULLY has this host of the secret and open enemies of life increased in modern times. When one reflects how little a savage of the South Sea Islands knows of diseases, and then takes a view of an European compendium of pathology, where they are marshalled by regiments and companies, and where their number amounts to several thousands, one cannot help being alarmed to find that so much is possible for luxury, corruption of morals, unnatural modes of living, and excesses. Many, nay, the greater part of these diseases, are occasioned by our own fault; and it is equally certain that new ones may be created by the like conduct. Others came into the world no one knows when or how, and were altogether strangers to the ancients. These are the most inveterate and destructive; the smallpox, the measles, and scarlet fever: and these even are so far owing to ourselves, that we suffer them to spread and exercise their ravages, without forming any regulations to check them; though it is proved that, by a proper exercise of reason, with the help of those observations that have been collected, we might banish them from our boundaries, in the same manner as they were introduced.

The greater part of diseases act either as violent kinds of death; the means of suddenly stopping vital operation, like the apoplexy; or as the means of shortening it gradually, by being either totally incurable, or, even when they are cured, by leaving behind them such a loss of the vital power, or such weakness and derangement of the

nobler organs, that a body so affected can no longer attain to that term of life to which it was originally destined.

The following short view, collected from different bills of mortality, will show, in the clearest manner, how monstrous that loss is which mankind sustain at present by disease. Of a thousand persons who are born, 24 die at their very birth; teething carries off 50; convulsions and other diseases during the two first years, 277; the small-pox, which, as is well known, destroys one in ten, carries off 80 or 90; and the measles 10. If they are females, 8 die in childbed. The asthma, consumption, and disorders of the chest, at least in England, destroy 190; violent fevers, 150; apoplexy, 12, and the dropsy, 41. Of a thousand persons also, we can allow only 78 who die of old age, or rather at an advanced period of life; for the greater part of these will fall a sacrifice to accidental affections. In short, it hence appears, that nine-tenths of mankind die always prematurely, and by the effects of disease.

I must here mention also a new and detestable disorder, which tends to the immediate destruction of life, I mean a propensity to self-murder. This unnatural passion, which prevailed formerly through direful necessity and heroic resolution, has now become a disease, which, in the bloom of youth, amidst the most favourable circumstances, merely by disgust and satiety of life, can excite the most horrid and irresistible desire to deprive one's self of existence.\* There are, indeed, men in whom every source of vital sensation and vital enjoyment is so exhausted, in whom every germ of activity and happiness is so deadened, that they find nothing so insipid, so disagreeable, and so disgusting as life; that they have no longer any points of contact with the world which surrounds them; and that life, at last, becomes to them such an oppressive burden, that they cannot withstand the desire of getting rid of it.

\* In seventy-five years, twice as many people in London fall a sacrifice to suicide as to the pleurisy.

And these men, for the most part, are such as, by youthful dissipation, and too early a wasting of the powers and vigour which ought to be the seasoning of life, have exhausted themselves, and become incapable of relishing its enjoyments. Is it not natural that such unfortunate beings should prefer death without all sensation, to a living death which their life may undoubtedly be called?

But the mischiefs of these already too numerous and dangerous enemies are infinitely increased, because people in part treat them very improperly, and in general abuse medicine too much.

Among those improprieties which regard the treatment of diseases, I reckon the following:—When people, notwithstanding every proof of their mischief, suffer the causes of disease to remain in activity: when one, for example, evidently observes, that drinking wine, the use of too light clothing, or sitting up late at night, brings on disease, and yet continues these practices; also, when one totally mistakes the disease, or will not allow that any exists, by which means a very trifling indisposition may be converted into a serious malady. And here I cannot help particularly mentioning a negligence to which the lives of thousands are undoubtedly sacrificed, I mean neglecting a *catarrh* or *cough*. People in general consider this as a necessary, and, in part, useful evil; and in that respect they are right, if the catarrh be moderate and do not continue too long. But one ought never to forget that every catarrh is a disease, and may readily end in an inflammation of the lungs, or, what is more frequently the case, in an asthma or consumption; and I do not say too much when I assert, that one-half of all the asthmas arise from catarrhs which have been thus neglected. Such mischief follows when they continue too long, or have been improperly treated; and I therefore recommend the two following rules, which ought to be sacredly observed by every one who is attacked by a catarrh of the chest. One must not overlook a catarrh cough more than a fortnight; if it continue longer, it must be considered as a disease, and be

treated by a physieian. Secondly, during the time every catarrh lasts, one must guard against violent heating of the body, cold, and the use of spices, wine, and other spirituous liquors.

It is also a too eommon mode of improperly treating diseases, that people often, partly from ignorance or prejudice, and partly through mistaken tenderness, do exactly the contrary of what ought properly to be done. Of this kind are, when people oblige the patient to eat, though he has no appetite; when, during feverish disorders, he is suffered to use beer, wine, coffee, meat-soups, and other rich and nourishing things, by which the slightest degree of fever may be changed into the most violent; when people, on the patient's complaining of a fever, and that cold which is connected with it, bury him immediately under bed-clothes, shut up the doors and the windows, and heat the air of the apartment as much as possible; and when they do not pay sufficient attention to cleanliness and ventilation. This injudicious treatment destroys more of mankind than disease itself; and is principally the cause why, in the country, so many strong sound men fall a sacrifice to death; why diseases there so readily assume a malignant quality; why, for example, the small-pox is more destructive there in winter than in summer, because people shut the doors and windows, and, by artificial means, keep up in the patient's bed-chamber a heat equally great perhaps as that which prevails during the summer.

And lastly, I reckon among these improprieties, when one consults no physician, or consults one that is unskilful, uses medicine injudiciously, has recourse to quacks, and employs *secret means, universal remedies, &c.*, of which I shall treat more at length when I come to the *rational use of medicine*.

The violent kinds of death also sweep off an immense number of mankind; and these, in modern times, have unfortunately made great progress. Not only have a more enlarged spirit of enterprise, the greater frequency of sea-

voyages, and more extensive trade, multiplied such accidents ; but people have fallen upon inventions for accomplishing the object of shortening life in an incredibly quick and refined manner. I shall here mention only gunpowder, and several new sorts of poison, such as *Aqua Toffana*, *Succession Powder*, &c. Nay, the art of killing has now become a peculiar and exalted science.



## CHAPTER V.

Impure air. Men living together in large cities.

ONE of the greatest means of shortening human life is, men living together in great cities. Dreadful is the preponderance which the ravage thence occasioned has in the bills of mortality. In Vienna, Berlin, Paris, and London, the twentieth or twenty-third person dies annually; while in the country around them, the proportion is only one in thirty or forty. Rousseau is perfectly right, when he says that men, of all animals, are the least formed for living together in great multitudes. The breath of a man is deadly for his fellow-creature; and this is the case both in a proper as well as a figurative sense. The moisture, or, as it is commonly called, the thickness of the air, is not what alone makes it prejudicial, but the animalization which it acquires by so many people being crowded together. We can at most breathe the same air only four times; for it is then, from the finest support of life, converted by ourselves into the most deadly poison. Let one now only reflect on the atmosphere of such monstrous places, where it is impossible for an inhabitant to inspire a mouthful of air that has not been for some time already in the lungs of another. This produces a general secret poisoning, which, upon the whole, must necessarily shorten the duration of life. Those men who are able, ought to avoid living in great cities: they are open sepulchres for mankind; and not only in a physical, but in a moral point of view. Even in cities of moderate size, where perhaps the streets are somewhat narrow, people should prefer a residence in the suburbs; and it is at least their duty to quit the city atmosphere for an hour or half an hour every day, merely in order that they may inspire a little fresh air.

## CHAPTER VI.

Intemperance in eating and drinking. Refined cookery.  
Spirituous liquors.

THE first thing which, in regard to diet, can act as a shortener of life, is *immoderation*. Eating and drinking too much is prejudicial to life two ways. It overstrains the powers of digestion, and thereby weakens them. It prevents digestion, because with such a quantity the whole cannot be properly prepared; and crudities in the intestines, and bad juices, are the consequence. It increases also proportionably the quantity of the blood, and thereby accelerates circulation and life; and besides, it gives rise to indigestion, and the necessity of using evacuants, which always weaken.

*To eat too much*, means when people eat till they can eat no longer; and the following are the signs:—When one experiences a heaviness and fulness of the stomach, yawning, eructation, drowsiness, and confusion in the head. The old rule, which contains much truth, ought, therefore to be always observed: Give over eating while you have still some appetite left.

*Too refined cookery* belongs to the same class. Unfortunately I must here exclaim against this friend of our palate, as one of the greatest enemies of life; as one of the most destructive inventions for shortening it, and in the following manner:—

1st. It is well known that the principal part of this art consists in making everything piquant and stimulating. Every article of food, therefore, is half composed, according to this preparation, of hot, stimulating substances; and instead of accomplishing, by eating, what is the natural object of it, nourishment and restoration, we increase

rather, by irritation, internal consumption, and actually produce the contrary. After a meal of this kind one has always an artificial fever; and those who use such food may justly say, *consumendo consumimur*.\*

2nd. The worst is, that people, by this cookery, are always induced to eat too much. They become such friends to their palate, that every remonstrance of the stomach is ineffectual; and as the palate is always tickled in a new and agreeable manner, the stomach has thrice or four times as much labour as it is capable of performing. For it is a very common fault, that one does not make a distinction between the appetite of the palate and that of the stomach; but considers that as a real, which is only a false, appetite; and this error is by nothing favoured so much as refined cookery. Man thereby loses, at length, one of the greatest supports of life, the property of knowing when he has had enough.

3rd. One grand maxim in this cookery is, by the most unnatural and most variegated compositions, to produce new stimulants, and new dishes. And hence it happens that things which singly and alone were perfectly harmless and innocent, acquire, by combination, properties altogether new and destructive. Acids and sweet substances, for example, do no hurt when used separately; but, when used together, they may become prejudicial. Eggs, milk, butter, and flour, are each, used by itself, very easy of digestion; but when joined together, and formed into a fat solid pudding, the produce will be extremely heavy and indigestible. It may, therefore, be laid down as a fundamental principle, that the more compounded any kind of food is, the more difficult it will be of digestion; and what is still worse, the more corrupt will be the juices which are prepared from it.

4th. A grand acquisition in the newest mode of cookery is the art of bringing nourishing juices into the body in the most concentrated form. Hence we have *consommés*, *jus*, *coulus*, and many other things of the like kind. By

\* In consuming we are ourselves consumed.—EDITOR.

expression, and boiling, people have found means to concentrate the substance of several pounds of beef, mutton, and marrow-bones, into the small size of a jelly or soup; and they imagine they have accomplished something great when they send such an essence of nourishment immediately, and at once, into the blood, without exposing the teeth to the trouble of chewing, or the stomach to the labour of digesting. That is to say, people imagine they can restore themselves full gallop; and this is the favourite system of those who consume themselves in that manner. But these people are miserably deceived; for,

In the first place, one can never deviate from the regulations of Nature without injury. Not without reason has it been made a law, that the stomach can receive only a certain quantity: a degree more would be too much for the whole. Everybody can admit only a proportionable quantity of nourishment; and this capacity of the whole is always in direct ratio with the stomach. Man here defrauds Nature: he goes beyond the first principle, if I may say so; and smuggles, as it were, into the body, three or four times as much nourishment as it is capable of receiving. The consequence is, a continual plethora of all the vessels; and this always destroys the equilibrium as well as the health, and, in the end, life itself.

Secondly, it has been established by Nature, on grounds equally good, that our nourishment should be used in a form rather coarse. The advantage of this law is, that our food is first chewed in the mouth, macerated and mixed with saliva: in the next place, that it is longer retained in the stomach, in order, by its stimulating quality, to incite the stomach to more reaction; consequently it is much better assimilated and changed into the nature of our substance. On this properly depends real restoration; for nourishment can pass into our bodies, and become truly useful to us, only after it has been, by the powers of the stomach, rendered homogeneous and similar to our substance.

By transgressing this first principle, one creates in the

body juices, which, because they have not been sufficiently assimilated, are unable to effect proper restoration; which, as foreign particles, tend rather to irritate; and thus promote consumption, much more than restoration.

In my opinion, therefore, it is highly proper that an art which prevents restoration, which fills us with raw undigested juices, and which increases internal consumption, should be considered, not as a friend of our life, but as one of its most essential enemies. One might almost imagine that it was invented to convert one of the noblest gifts of God into a secret poison.

Lastly, we may place in this class, of things that tend in a particular manner to shorten life, all *preparations of spirituous liquors*, which, under whatever name known, are, in that respect, highly prejudicial. When people drink these, they drink liquid fire. They accelerate vital consumption in a dreadful manner; and make life, in the properest sense, a process of burning.



## CHAPTER VII.

Passions and dispositions of mind which shorten life. Peevishness.  
Too much occupation and business.

CERTAIN habits and dispositions of mind, such as melancholy, care, dejection, fear, anxiety, faint-heartedness, and, in particular, avarice and hatred, which are hostile to life, claim a distinguished rank among those means which tend to shorten it.

All these exhaust the finest of the vital powers; destroy, in particular, digestion and assimilation; weaken the vigour of the heart; and, by these means, impede the important business of restoration. The first or melancholy affections act, however, negatively in shortening life. On the other hand, those of avarice and hatred have, as it were, a positive property of bringing on death. They not only deprive the body of its vital powers, but, as they incessantly sharpen the bile, they are continually preparing a secret poison; and by the general irritation of the bile, increase, in an extraordinary degree, self-consumption. That motto, therefore, is highly proper: Avarice consumes itself.

To these belongs that malignant disposition of mind known by the name of *peevishness*. Nothing can so much blast the bloom of life, shut up every access to pleasure and enjoyment, and change the beautiful stream of life into a stagnated puddle, as this disagreeable habit. I advise every one who regards his life to fly from this deadly poison, and never to suffer it even to approach.

*Fear*, also, deserves here a particular place. It belongs, in like manner, to those bad habits of mind which one can harbour or banish at pleasure.

Walter, an Englishman, who sailed round the world

with Anson, was conversing one day with young Berkenhout; and as the latter happened to mention the word Fear, Walter, with some emotion, replied, *Fear is a base passion, beneath the dignity of man.* And, without doubt, it is one of the most absurd: a passion which debases and degrades man, as much as its opposite passion, courage, can exalt and elevate him above human nature. Fear robs him of power, reflection, judgment, resolution; in a word, of all that pre-eminence which the human mind enjoys; and, to accustom children not to fear, ought to be one of the first principles of education. But, unfortunately, the direct contrary is the case. I shall here enlarge on two only of the most usual kinds of fear: fear of thunder, and fear of apparitions or spirits. Now he who is subject to both these may bid farewell to happiness and tranquillity. The period of night, which by its obscurity is so wisely destined for sweet repose, is to him the signal of the most painful uneasiness. While others enjoy peaceful sleep, he listens with trembling and dismay to the smallest sound; the sweat of horror bursts forth from every pore of his body; and he is more fatigued in the morning, than at the moment when he lay down.

The joyful season of summer is to him also a period of terror and dread; and every fine day brings with it the idea of thunder, and the apprehension of danger.

One may easily comprehend what destructive influence such continual misery must have on the duration of life. Fear is an incessant cramp; it contracts all the smaller vessels; the whole skin grows cold, and perspiration is completely checked. The blood is collected in the interior large vessels; pulsation becomes irregular; the heart is overcharged, and cannot move with freedom. The important business of circulation is therefore deranged. Digestion is also interrupted, and erampish affections take place. All the muscular power is palsied; the sufferer attempts to run, but is not able; he is seized with a general shivering; he breathes short, and with difficulty; in a word, fear has all those effects which are produced by

a mortal secret poison, and its consequences are equally pernicious in shortening life.

It is impossible for me to omit here a characteristic of modern times, which certainly deprives us of a valuable part of our life : namely, that unfortunate spirit of restless enterprise (*polypragmosine*), which at present subdues a great part of the human race ; an incessant sickleness, and propensity to new undertakings, new labours, and new plans. The genius of our age seems to incline men, much more than is natural for them, to reflection, activity, speculations, and reformation of every kind ; and to exercise with more vigour all the powers which they possess : for the great increase of luxury, by still multiplying its wants, makes new schemes and new exertions of the faculties always more necessary. Hence arises that endless uneasiness which destroys all sensation of internal tranquillity and contentment ; which never suffers men to enjoy that degree of peace and relaxation indispensably requisite for restoring them ; and which, consequently, in an alarming manner, accelerates consumption.

## CHAPTER VIII.

## The fear of death.

No kind of fear is attended with more unhappiness than the fear of death. He who is subject to it dreads something which is totally unavoidable, and against which we can never be a moment secure. He enjoys pleasure with trembling and anxiety; he denies himself everything, because everything may be the vehicle of death; and, by this everlasting apprehension of losing life, he loses it in reality. No one who feared death ever attained to a great age.

*Love life, and fear not death!* is a command and a prophecy, the only true frame of mind to become happy and old; for, whoever fears death may bid farewell to happiness. To him no enjoyment is pure; every pleasure is poisoned with the idea of death; he is always like a malefactor pursued; the enemy is continually at his heels; and yet there are an immense number of people who are not able to banish from them this disease of the mind. For the benefit of these I shall here lay down some rules, which, though they may not display much metaphysical acuteness, I can recommend as good preservatives against the fear of death; and which I know by experience, to have been effectual:

1st. Let a man make himself very familiar with the idea of death. He alone, in my opinion, is happy, who has so often, and in so undaunted a manner, looked this unavoidable enemy in the face, that, by long custom, it has at length become to him a matter of indifference. How much do those deceive themselves who imagine they have found, in banishing the thoughts of death, the best

remedy for the fear of it. Before they are aware, amidst the most lively enjoyment will the idea rush upon them, and derange them the more, the less they are acquainted with it. In a word, I can call those alone fortunate who have carried this custom so far, that in the moment of joy they can think of death without being depressed; and my readers may believe me, for I assert it on my own experience, that, by often dwelling upon this idea, and moderating its appearances, we shall at length acquire a wonderful indifference respecting it. Let us only turn our attention to soldiers, sailors, and miners. Where shall we find men more contented and happy, more susceptible of every joy? And for what reason? Because, by their continual approach to death, they have learned to despise it. He who no longer fears death is alone free; there is nothing else that can fetter his senses, disturb him, or render him unhappy. His soul is filled with exalted and undaunted courage, which strengthens the vital power, and which is therefore a positive means of removing this fear.

This custom is attended also with some concomitant circumstances which are undoubtedly of no little importance. It is an excellent help to enable one to continue honest and virtuous. On every occasion of doubt, when the question arises whether an action be right or wrong, let a man think only on the last hour of his life, and ask himself, Wouldst thou then do so; wilt thou then wish to have acted so? Innocence is certainly that happy state, that enjoyment of life, which can enable a man to think on death without terror. If a man harbour enmity or revenge against another, if he entertain a wish of avenging an injury done to him, let him only reflect on that hour, and on the state in which his thoughts will then be, and I engage that his ideas of enmity and revenge will immediately forsake him. The reason is, that, by thus changing the theatre of action, all those little selfish objects by which we are usually guided are removed; everything at once appears in its proper point of view,



under its just proportion; the deception vanishes, and nothing remains but what is real.\*

2nd. Many fear death much less than the operation of dying. People here form the most singular conception of the last struggle, the separation of the soul from the body, and the like. But this is all void of foundation. No man certainly ever felt what death is; and as insensibly as we enter into life, equally insensibly do we leave it. The beginning and end are here united. My proofs are as follows: First, man can have no sensation of dying; for to die, means nothing more than to lose the vital power; and it is the vital power by which the soul communicates sensation to the body. In proportion as the vital power decreases, we lose the power of sensation, and of consciousness; and we cannot lose life, without at the same time, or rather before, losing our vital sensation, which requires the assistance of the tenderest organs. We are taught also by experience, that all those who ever passed through the first stage of death, and were again brought to life, unanimously asserted that they felt nothing of dying, but sunk at once into a state of insensibility. Let us not be led into a mistake by the convulsive throbs, the rattling in

\* Allied with the fear of death is the foolish objection which some people have to making their wills, and doing that which none others can do so well as themselves,—namely, arranging their affairs. Indeed I have known some so irrational as to entertain alarm at the insurance of their lives; as though the thought on death could hasten its approach. The duty of making a will is one which ought to be performed by every person, the moment he arrives at man's or woman's estate, and the neglect of that duty I regard as a dangerous sin. The great Locke, in a letter to Lord King, has these memorable reflections on making his will:—"I shall not die the sooner for having cast up my reckoning, and, judging as impartially of my state as I can, I hope I shall not live one jot the less cheerfully the time that I am here, nor neglect any of the offices of life whilst I have it; for whether it be a month, or a year, or seven years longer—the longest any one out of kindness or compliment can propose to me—is so near nothing when considered and in respect of eternity, that if the sight of death can put an end to the comforts of life, it is always near enough, especially to one of my age, to have no satisfaction in living."—*Lord King's Life of Locke*, 2nd edit, p. 40.—EDITOR.

the throat, and the apparent pangs of death, which are observed in many persons when in a dying state. These symptoms are painful only to the spectators, and not to the dying, who are not sensible of them. The case here is the same as if one, from the dreadful contortions of a person in an epileptic fit, should form a conclusion respecting his internal feelings. From what affects us so much, he suffers nothing.

3rd. Let one always consider life, as it really is, a mean state, which is not an object itself, but a medium for obtaining an object, as the multifarious imperfections of it sufficiently prove; as a period of expansion and preparation, a fragment of our existence, through which we are to be fitted for and transmitted to other periods. Can the idea, then, of really making this transition; of ascending to another from this mean state, this doubtful problematical existence, which never affords complete satisfaction, ever excite terror? With courage and confidence we may, therefore, resign ourselves to the will of that Supreme Being, who, without our consent, placed us upon this sublunary theatre; and give up to his management the future direction of our fate.

4th. Remembrance of the past, of that circle of friends who were nearest and always will be dearest to our hearts, and who, as it were, now smile to us with a friendly look of invitation from that country of darkness, will tend also very much to allay the fear of death.

## CHAPTER IX.

Idleness. Inactivity. Languor.

BUT an opposite conduct, that of neglecting to exercise our powers, may tend also to shorten life; because, by these means, the organs will soon become unfit for use; and derangement of them, interrupted purification of the juices, and bad restoration must be the consequence. It was the first and unalterable destination of man, that he should earn his bread by the sweat of his brow. And this principle is fully confirmed, in a physical sense, by experience: he who eats without labour will never thrive. If the necessary proportion be not preserved between restoration and self-consumption, it is impossible to retain health or prolong life. If we consult observation, we shall find that no idler ever attained to a great age, and that those who have been distinguished by their longevity were all men whose lives had been extremely active and laborious.

But mental idleness is hurtful, as well as bodily; and I now come to a means of shortening life, which perhaps my readers did not expect, because it apparently makes the time appear to us so long: I here allude to languor. Let us examine the physical effects of it a little closer, and we shall see that this unpleasant state of mind is by no means a matter of indifference, but that it is attended with very important consequences to the condition of our bodies. What do we remark in a man who is subject to languor? He begins to yawn; this already betrays that the passage of the blood through the lungs is interrupted. The power of the heart and vessels suffers of course, and becomes too torpid. If the evil continue longer, accumulations and stoppages of the blood take place. The organs of digestion

acquire a tendency to weakness ; and inactivity and debility, melancholy, flatulency, and hypochondriac affections ensue: in a word, all the functions are thereby weakened and deranged; and I think I may with truth affirm, that a state which disturbs the most important operations of the body, and which enfeebles the noblest powers, is a shortener of life also.

Languor, in a physical as well as a moral view, is a state of danger. Weikard mentions the instance of a child born of poor parents, who were obliged to earn their bread by their daily labour. The state of this child, from its birth, was therefore languor. At first the parents suffered it to lie alone in its cradle, where it spent its time in looking at its hands and feet. When it became bigger, it was always shut up in a hen-house, where it could see out only through a small hole. What was the consequence? The child, when it grew up, remained heavy and stupid; showed no signs of reason, and could scarcely speak.

Nay, it is attended with effects still more destructive. With a melancholy temperament, languor may at length conduct one to self-murder. A dull English author, who has written a voluminous work on suicide, relates, that he one day met one of his countrymen who exhibited every appearance of deep thought. "Whither art thou going, my friend?" said the author. "To the Thames, to drown myself." "I beg of you," replied the author, "to return home for this time, and to read over my work on suicide." "God forbid!" answered the other. "It was reading that cursed, tedious book, which excited in me such a dreadful disgust of life that I am now firmly resolved to drown myself."

But I think I hear every one ask, What in the world is the best remedy for languor? It accompanies us to the ball, to the play-house, to the tea-table, in our walks; in short, it is impossible for us to get rid of it! What you say is perfectly true, but it does not relieve us. There is only one, but not a very agreeable, remedy for it, and that is *regular employment*.

## CHAPTER X.

Overstrained power of the imagination. Imaginary diseases.  
Sensibility.

IMAGINATION was given us as the seasoning of life; but as physical seasoning must not be made our daily nourishment, our mental life, in the like manner, must not abuse this seasoning of the soul. Too much of it will, indeed, exalt vital sensation; but one thereby increases intensive life together with consumption, and prevents restoration, as is proved by the meagreness of such people as have fervid imaginations. Besides one, by these means, disposes the body to sudden as well as violent revolutions, which may become dangerous to life, because, with an overstretched imagination, it is possible for a small spark to produce a most dreadful explosion. He, therefore, who wishes to live long, must never suffer this power of the soul to assume a superiority, or to occasion a continued state of exaltation; he will apply it to that purpose for which it was bestowed upon us, to give a higher lustre to the agreeable moments of life, to season the unfortunate or insipid, and to enliven the melancholy.

This faculty may be highly prejudicial to life, when it acquires certain tendencies, which, by their collateral effects, produce double mischief; and of these, two appear to me to be particularly dangerous, a propensity to *imagine diseases* and *too great sensibility*.

The first disease of the imagination is principally peculiar to hypochondriacs; but may be excited in those who are not physicians, if they read works on medicine, which they do not, like professional men, apply to the art, but to their own persons; and who, for want of sufficient know-



ledge, conjecture often very erroneously. Of this I have seen astonishing instances. Not only people who, with features perfectly regular, supposed that their noses stood awry; and who, though slender and sound in every respect, could not get rid of the idea that they were in the last stage of the dropsy, but I have seen a lady who, if asked whether she had not this or the other local disorder, felt in a moment every symptom of it. Having asked her if she had not the headache, she was instantly seized with it; and on asking, in the like manner, respecting the cramp in the arm, and the hiccough, both these affections immediately took place.

Tulpius mentions the instance of a man who, by reading a great number of medical and chirurgical books, became quite frantic.

Monro saw a man, who, by studying medicine under Boerhaave, had become hypochondriacal. Whenever he attended any of Boerhaave's lectures, he always imagined that he was affected with the disease which had been the subject of it. By these means he was a continual living commentary on the science of physic; but he had scarcely gone half through this destructive course of medicine, when he found himself so wretched and exhausted that he was obliged to give up the study altogether. Nay, we have had the instance of a person who imagined himself to be actually dead, and who, therefore, would have been starved, had not a friend, who pretended to be dead also, persuaded him that it was customary in the other world to eat a sufficient quantity daily.

The misfortune attending this weakness not only is that it occasions constant fear and dread, and that many diseases are actually excited because people suppose they are afflicted with them, but it induces patients to have recourse to useless and preposterous medicines, and to quackery without end, which often consume the body much more rapidly than the disease itself would, did it really exist.

No less dangerous is the second disease of the imagina-

tion, *sensibility*; a romantic turn of mind, melancholy enthusiasm. It is altogether the same whether one really suffers under distressful events, or, by reading romances and indulging sensibility too much, has made one's self so feelingly alive to every impression as to be overcome by the sensation it occasions. Nay, the latter case is the more prejudicial; as the one is the natural state, but the other artificial; and its affections are, therefore, more violent and stronger. We have already seen how highly destructive melancholy is to the vital power and to every vital movement. One may easily comprehend, then, how baneful such a state must be, which subjects the mind to continual affliction at the hazard of life, and which cannot partake in refined pleasures without tears and heart-breaking sensations. What extinction of all energy, of all cheerfulness and courage! Two years spent in such a state of anguish, would undoubtedly shorten life in a considerable degree.

## CHAPTER XI.

Poisons physical as well as infectious.

By these I understand all those substances which, even in small quantity, are capable of producing very prejudicial or destructive effects on the human body. Of these there is a great abundance in nature, and of various kinds. Some act violently, others secretly; some suddenly, others slowly; some externally, others internally; some visibly, others invisibly; and it cannot be denied that they may be classed among the most general and the most dangerous enemies of life.

I consider it, therefore, very necessary, as an essential part of that universal knowledge which ought to be cultivated among mankind, that every one should learn to know and to guard against these poisons; because people otherwise may, through mere ignorance and inattention, be liable to be poisoned a thousand ways. Animals have instinct to enable them to distinguish and to avoid poisons; man has reason and experience; but these, in this respect, are far from being sufficiently employed. My object, therefore, here, is to give mankind such a comprehensive knowledge and conception of their danger as may induce them to guard against these enemies of life.

It is a very hurtful prejudice that people, in common, consider nothing as poisonous but what can be received through the mouth. On the contrary, we may be poisoned externally, as well as internally, through every part of our bodies, so far as they have absorbing vessels; through the mouth and stomach, through the whole superficies of the skin, the nostrils, the ears, and the lungs, by means of bad air. The only difference is, that the effects, in many parts,

take place slowly; in others, rapidly; and that many kinds of poison have an effect, in particular, upon one part, and some upon another.

I divide poisons in general into two classes, *physical* and *contagious*; the latter of which are distinguished by their being generated in a living body, and possessing the power of communicating themselves to another.

Among *physical* poisons, a knowledge of the following is particularly necessary:—

*Arsenic*, better known under the name of rat-poison, is the most violent of all. The smallest dose (five or six grains) is sufficient to destroy a person with the most excruciating torture. Numberless are the instances of people having suffered a severe death from it, but rather through ignorance and carelessness than through intention. I am of opinion, therefore, that it would be much better if this horrid poison were entirely banished; especially as it is of so little use, and is employed almost for nothing else than to kill rats and mice. At any rate, it ought not to be kept by grocers and apothecaries, near drawers where there is coffee, sugar, or any article used as food. In the mean time, I consider it as my duty to call the public attention to a few ways in which poisoning by arsenic may very easily be possible; in which it often happens; and to warn mankind against them. One of the most frequent is, when it is used to destroy vermin. If one reflects how many people have been deprived of existence by poison destined for mice, this practice ought to be altogether abandoned. Let not any one imagine that all danger may be prevented by great caution. I know an instance where some sweet milk, standing in a cellar, was poisoned by mice who had used some of it after eating rat-poison. It is much safer to employ for the same purpose poison-nuts, (*Nux vomica*); which are far less hurtful to man, but at the same time are a strong poison for animals. Another kind of poisoning with arsenic, less observed, is that by means of arsenical colours. Painters by profession know how to secure themselves against it; but amateurs and children should

be very cautious in using such colours, and at any rate avoid that bad practice of drawing the brush through their mouth. Equally dangerous are toys painted with these colours, which ought never to be allowed. Lastly, I advise every one to guard against a method of poisoning with arsenic which is practised by quacks and mountebanks. These impostors sell abundance of drops, as a cure for the cold fever, which contain nothing but arsenic. They indeed often cure the disease immediately; but they occasion consumption afterwards, and other fatal consequences. Let people, for Heaven's sake, avoid all such arcana.

A poison no less dreadful is *lead*. It is, perhaps, so far more terrible, as it acts more secretly as well as more slowly; does not discover itself immediately, by such violent effects; and because people may be completely ruined by it, before it is known that they are poisoned. With this substance, in particular, poisoning is possible several ways, which the greater part of the public have never remarked, and against which I must here put them on their guard. In the first place, when people daily swallow with their food and drink some portion of lead, the most dreadful symptoms, impossible to be cured, may at length break out, often even at the end of some years. This happens when victuals are dressed in vessels made of tin, which contains much lead, or in such as are badly glazed; or when one drinks wine adulterated with lead. Another very usual method of poisoning is by painting the face with white-lead, using washes made from lead, &c. All paints are prejudicial, but chiefly the white, because the whole of them almost contain white lead; and the leaden particles may be conveyed into our bodies, as well through the skin as through the stomach. Lastly, poisoning by means of apartments newly painted with white lead, or oil-varnish, ought not to be forgotten. Whoever inhabit these too soon, may, in particular, receive the poison into their lungs, and become hectic and asthmatic.

To the same class belong, also, *quicksilver*, *antimony*, and *preparations of copper*; which ought all to be consi-



dered as noxious poisons, and which should be guarded against, particularly the last, in regard to cooking victuals in copper vessels. Even the greater part of neutral salts, when used in too great quantity at once, and not sufficiently dissolved in water, may be attended with poisonous effects. I have met with some instances where an ounce, or an ounce-and-a-half of alum or saltpetre, taken at once, instead of Glauber's salts, excited every symptom of the most violent poison, and which could not be removed but with difficulty.

The vegetable kingdom contains a multitude of poisons, which partly occasion death by torpor, such as *opium* and deadly nightshade; and partly by burning and inflammation, as *mezereon* and *euphorbium*. Great mistakes are committed here, also, through inattention. Numberless are the instances where people, instead of chervil (*chænopodium*) for salad, have used hemlock; instead of parsnips, have eaten the roots of henbane; instead of common mushrooms, poisonous fungi; or used the berries of the nightshade, mezereon, &c., by which they brought on death. In every seminary of learning, therefore, a sufficient knowledge of all the poisonous plants growing in the neighbourhood should be taught.

The poisonous plants most pernicious, and which it is most necessary to know and guard against, are the *belladonna*; hemlock (*cicuta*); henbane (*hyosciamus*); wolfsbane (*aconitum*); foxglove (*digitalis*); nightshade (*solanum*); darnel (*lolium temulentum*); mezereon (*Daphne*); several sorts of the ranunculus; poisonous lettuce (*lactuca virosa*); and the laurel-cherry (*laurocerasus*). To these belong also bitter almonds, which, according to the latest experiments, contain a deadly poison, not inferior to that of the laurel.

The air even, in which we live, can be poisoned so as to destroy us either suddenly or secretly. I shall here speak, in the first place, of that poison which we ourselves communicate to the atmosphere by living and breathing. Living beings consume, in a certain quantity of air, that

pure substance which we call vital air (oxygen); and, in place of it, give back an impure substance (carbonic acid gas) not fit for breathing. If a great multitude of people are shut up in a small space, death may soon be the consequence.\* If the space be larger, and the number less, though death may not ensue, the effects may be still prejudicial. All places, therefore, where numerous bodies of people are crowded together, ought to be avoided; particularly when they have not a sufficient height or free passage for the air. This is most frequently the case in play-houses. One of the surest signs of the air being poisoned, is when the lights will no longer burn clear and readily, or here and there go out of themselves. In an equal degree is it then unfit for life, because fire and life require the same part of the air for their support. Those who keep their sitting apartments or bed-chambers always closely shut, expose themselves to a slow poisoning of the like kind. In the same manner may the air be poisoned when a great many lights are kept burning in a close room. And the case is the same when one sleeps in a close bed-chamber where coals are burning, by which death is often the consequence. When one keeps in a close bed-chamber, during night, a great many plants and shrubs, the air experiences a similar kind of poisoning; while, on the other hand, the same plants, in the day time, and exposed to the sun, render the air more pure and wholesome. Evaporation from putrid substances is capable of producing the like effect. The strong smelling effluvia of flowers can communicate to the air, in close apartments, a pernicious, and even a deadly quality also; and therefore it is not proper to keep in one's bed-chamber strong scented flowers, such as the narcissus, roses, &c.

But far more important and dangerous appear to me the class of *infectious poisons*, to which I now proceed; and I

\* This is sufficiently proved by the dreadful instance which happened in the black hole at Calcutta, where, of 146 Englishmen, confined scarcely twelve hours, 123 were destroyed by the air being thus poisoned.

earnestly request that my readers will pay the utmost attention to the observations I shall make respecting them. Concerning physieal poisons, people may always procure information: there are works which treat of them; they are known, and consequently can be avoided. With infectious poisons the case is quite different. They have been overlooked, as unavoidable and necessary evils; they have not been much considered as poisons, but in regard to the diseases which they occasion; people poison, and are poisoned; and this dreadful secret trade is carried on daily and hourly, without men knowing or reflecting what they are about. Physical poisons, as is proper, have been subjected to police laws: the State takes care that they shall be carefully kept, and that the use of them be limited; and those who wilfully administer them to others, are treated as criminals, and punished. The infectious poisons, on the other hand, are restrained by no laws, by no police ordinances: they exercise their ravages among us without interruption; the husband poisons the wife, the son the father; and no one takes any trouble to remedy this evil.—Lastly, physical poisons hurt only the individual; whereas the infectious possess the peculiar power of reproducing themselves in every living being, and of multiplying without end; they injure, therefore, not only those poisoned, but render them new sources by which whole neighbourhoods and districts may be infected.

I could here produce the most melancholy instances of men who merely through ignorance were poisoned in this manner; and of some who infected others, even their nearest friends, because they were unacquainted with these poisons, and the way in which they are propagated. I, therefore, consider a knowledge on this subject so necessary, and so defective among the public, that I with pleasure embrace the present opportunity of saying something upon it, which may be of general utility.

Infectious poisons are such as can be no otherwise generated than in a living body; and which possess the

power of reproducing themselves when communicated to another, and of giving rise to the same corruption and disease which prevailed in the former. Each class of animals has one peculiar to itself, and which does not take any effect upon another. Thus mankind have some which do not attack animals: for example, the smallpox.\* Animals, on the other hand, are susceptible of some which do not affect men; as, the disease among horned cattle, and the glanders among horses.† I am acquainted with only one peculiar to men as well as animals, and that is the poison of canine madness.

A very remarkable difference between these poisons is, that some of them never appear again without fresh external infection; as, the smallpox, measles, and plague: while others may be again produced, without infection, merely by corruption, and certain changes which take place in animal bodies; and among the latter class are the putrid fevers. It has, therefore, been often asked, Whence did the poisons of the first class arise? And, indeed, it is difficult to answer this question. The analogy of the latter class, however, allows us to suppose that they were first generated in the human body, but through so rare a concurrence of external as well as internal circumstances that thousands of years, perhaps, must be necessary before the same thing can again happen. It hence follows, that these poisons, as they must always, in order to continue, be produced in a human body, may again cease, as soon as they have been deprived, either by accident or precautionary regulations, of an opportunity to regenerate. A consoling reflection, on which the extirpation, or at least banishment of them from certain districts depends; and of the truth of which we may be convinced by finding that some of these poisons, such as

\* The smallpox is met with in sheep; and the cowpox is now recognised as the smallpox of the cow. In my work on "Diseases of the Skin" I have recorded examples of human smallpox being communicated to cows.—EDITOR.

† Glanders is now too well-known to be communicable to man, and to give rise in him to a virulent and fatal disorder.—EDITOR.

those of the plague and leprosy, have, by wise establishments, been driven from among civilized nations. But this consequence is also equally well founded, that, by a new concurrence of uncommon circumstances and corruption in the bodies of animals, an entirely new poison of the like kind, hitherto unknown in the world, may be again created.

Before all these kinds of poison, however, can have effect, there is necessary, not only a communication or infection from without, but also a certain disposition or sensibility of the body. Hence that remarkable phenomenon, that many can be poisoned very easily, some with difficulty, and many not at all: nay that many of these poisons can affect us only once, because, by being once poisoned, the whole sensibility of the body, in regard to the infection, is destroyed; as we find to be the case in the smallpox and measles.

Infection may apparently be communicated in a great variety of ways; but it is always confined to this simple principle, *that immediate contact with the poison is necessary before it can be conveyed to another*. This, however, must be properly understood. One may come into immediate contact with the poison, either by touching the body of a diseased person, or any other body with which the poison is united, or to which it has attached itself; as, for example, clothes, furniture, &c. A few poisons of this kind have the property of diffusing themselves through the atmosphere, as those of the smallpox, measles, and putrid fevers; but this contaminated air remains poisonous only in the neighbourhood of the diseased, or, in other words, the atmosphere only around the diseased person is poisonous. If it be, however, mixed with and thinned by purer air, like every other poisonous solution, it ceases at length to have a poisonous effect; that is to say, the poison cannot be conveyed by the atmosphere to any great distance.

My principal view here is to enable that part of the public unacquainted with physic to guard against these



poisons; or, what cannot be a matter of indifference to any person of benevolence, to avoid communicating the poison to others when one is infected. I shall, therefore, first, give a few rules how people may secure themselves from infection in general; and then treat singly of those kinds of poison which appear most commonly among us, and show how they may be distinguished and avoided.

The best means by which people, in general, may secure themselves from infection of every kind, consist in the following rules:—

1st. Pay the utmost attention to cleanliness; for the greater part of the poisons of this kind are conveyed to us through the external surface of our bodies: and it is fully proved, that poison, already communicated, has been by cleanliness removed before it could actually produce any bad effect. I here allude, in particular, to frequent washing, bathing, rinsing the mouth, combing the hair, and often changing the linen, clothes, and bed.

2nd. Be careful to admit pure air into your apartments, to enjoy the free air often, and to give the body proper exercise. By these means, one will preserve the perspiration and vital power of the skin; and the more active these are, the less danger is to be apprehended from external infection.

3rd. Let people endeavour to keep themselves in good spirits, and preserve serenity of mind. Such a disposition is best calculated to support the counteracting power of the body, free perspiration, and the outward tendency of the juices, by which the catching of infection is much prevented. This rule is particularly to be recommended where putrid fevers prevail; and there also a glass of good wine may be serviceable.

4th. Avoid coming into close contact with people, the physical state of whose bodies you do not perfectly know; and, in particular, beware of touching them with parts which have no skin, or one exceedingly delicate and tender; such as wounds, the lips; as, by these, infection is soonest imbibed. Of the like nature is the touching of sub-

stances which a little before may have been used by others.

5th. When infectious diseases are prevalent in any district, I would strongly advise people not to go abroad at night, because one imbibes infection much more readily in the night than the day time.

## CHAPTER XII.

Old age. Premature ingrafting of it on youth.

THIS is the most unavoidable of all those means that tend to shorten life. It is a secret thief, as Shakspeare calls it, the necessary consequence of life itself: for, by the vital process, our vessels must become gradually more desiccated and unfit for use, our juices more aerid and less, the smaller vessels shrivelled, the organs incapable of performing their functions; and the earthy part, the surest means of our destruction, must gain a superiority.

It cannot, therefore, be altogether prevented. The question only will be: Is it in our power to bring it on sooner or later? And, unfortunately, this question must be answered in the affirmative. Modern times afford us astonishing instances of the possibility of bringing on premature old age, and of causing the periods of life to follow each other much more rapidly. We may see at present, particularly in great cities, men come to maturity in their eighth year; in their sixteenth, attain to the highest point possible of their perfection; in their twentieth, struggling with every infirmity, a proof that they are already on the decline; and in their thirtieth, have every appearance of exhausted age, such as wrinkles, dryness and stiffness of the joints, a crooked spine, loss of sight and memory, grey hair, and a tremulous voice. I once dissected the body of such an artificial old man, who had scarcely attained the age of forty; and found not only his hair grey, but the cartilages of the ribs, which do not become bones until the greatest age, totally ossified.

One, therefore, can imitate by art, in our climates, that

hastening of the periods of expansion as well as of old age, which, in warm countries, takes place naturally.

I must now say a few words on the art of ingrafting old age on youth. This is done by weakening very early the vital power as well as the juices, and giving to the vessels the highest possible degree of hardness, stiffness, and want of pliability, which characterizes old age.

I shall here lay before my readers the surest means to accomplish this, as it is of importance to know such prescriptions, in order that people may be better enabled to counteract them. If one, therefore, will only live altogether contrary to the following rules, one may be enabled to preserve one's self in a state of youth to an advanced period of life.

1st. Endeavour, by every art physical and moral, to attain to maturity as speedily as possible, and waste the vital power with as much profusion as possible.

2nd. Begin very early to expose yourself to the utmost fatigue. Forced journeys of several days, continual dancing, sitting up all night, and shortening every period of rest, will, in this respect, be of most service. By these means you will accomplish two objects, that of speedily exhausting the vital power, and that of making the vessels soon hard and brittle.

3rd. Drink abundance of wine and strong liquors. This is an excellent prescription to desiccate the body, and to make it become shrivelled.

4th. Care, fear, and sorrow, are extraordinarily well calculated to bring on, very early, every characteristic of old age. We have instances of persons acquiring grey hair in the course of one night spent under the highest degree of grief and terror. Now, one might believe, that certain causes are absolutely necessary to produce these affections: but there are people who understand, in a masterly manner, the art of seeing everything in a melancholy light, of dreading some evil from every man, and of finding in the most common circumstances abundant matter to excite wretchedness and misery.

5th. That system, carried too far, or at least badly understood, of hardening the organs by the means of cold, bathing frequently and for a long time in cold water; nothing can be more proper to produce every symptom of age.

But it is not enough that people now attain old age, in a period during which our ancestors were still young: they unfortunately go farther. They have found out the art of bringing into the world children with old age upon them. Such phenomena I have sometimes seen. These shrivelled beings enter upon the stage of life with the strongest features of age; and, after two weeks spent amidst misery and crying, they close their aged life, or rather begin existence by ending it. But I shall draw a veil over these horrid productions of parental dissipation, which appear to me like the embodied sins of the parents.



## PART III.

## MEANS WHICH PROLONG LIFE.

## CHAPTER I.

## Good physical descent.

IF we take a retrospective view of the principles on which longevity depends, and the properties necessary for promoting it, we shall readily perceive that much in particular will depend on the mass from which we are formed; what quantity of vital power is communicated to us at our creation; and whether a foundation be then laid for a strong or a weak constitution, a sound or a diseased structure of the vital organs. All this is intimately connected with the healthful state of our parents, and the important point of our first existence; and in that sense, to be of *good birth* is what ought to be wished in regard to every man. It commonly belongs to those unknown yet important benefits which we receive; and is a means of prolonging life. This advantage, however, we are not able to procure to ourselves; but we have it in our power, and it is our duty to communicate it to others.

Three points are here to be considered: the state of health in which the parents are; the moment of generation; and the period of pregnancy.

1st. *The state of health, or the vital stock of the parents.*  
—How important this is may be seen by the instance of whole families in which longevity has been as it were a privilege; like the family of the before-mentioned Parr, who not only attained to a great age himself, but also his

father and children. In the longevity of parents lies a great ground for enabling their children to attain to the same. This, therefore, ought to be a powerful motive to induce those who intend to have children to spare and preserve their vital power as much as possible. We are a copy of our parents, not merely in regard to the common form and texture, but in respect to particular weaknesses and faults of single parts. A foundation even for diseases, which have their root in our structure and constitution, may be thus communicated. I am convinced, above all, by repeated experience, that great weakening of the constitution by early excesses, communicates to children a peculiar weakness of the glandular and lymphatic system, which ends in the serofula, as it is called; and occasions this disease to appear in the first months of life, or even at the very birth. The too youthful or too great age of the parents is likewise prejudicial to the strength and vital duration of the children.

2nd. *The moment of generation.*—This is of much more importance than commonly believed, and has great influence, both in a moral and physical view, on the life of the future being. The first germ of a new creature is here quickened; the first vital power is communicated to it. How much must the perfection or imperfection of the produce be determined by a perfect or imperfect, sound or diseased condition of the active causes? Is it not to be wished that parents would pay some attention to this remark, and never forget that the above moment is of the utmost importance; that it is the moment of creation; and that Nature, not without reason, has connected with it the highest exaltation of our existence? However difficult it may be to collect observations from experience on this subject, I have known some undeniable instances where children, begotten in the moment of intoxication, remained stupid and idiots during their whole life. Now, what can be effected by the highest extremity, may be done, on a small scale, by a mean degree; and why should it not be admitted, that a being procreated at the period

of ill-humour, bodily indisposition, or nervous debility, may carry with it, during its whole existence, some small particles of these evils? Hence the evident preference of the child of love to the children of duty. In my opinion, therefore, it is of the utmost importance, even in the married state, that this moment should be confined to a period when the sensation of collected powers, ardent passion, and a mind cheerful and free from care, invites to it on both sides; and this forms a new ground against the too frequent, forced, or mechanical enjoyment of wedded love.

3rd. *The period of pregnancy.*—Though the father, without doubt, is the original source from which the future being acquires its first quickening, its earliest breath of life, the general mass and most material part proceeds entirely from the mother. The latter is the soil from which the seed derives its juices; and the future constitution, the proper substance of the child, must principally assume the character of that being of whom it makes so long a part, and of whose flesh and blood it is actually composed. Besides, not only the constitution of the mother, but also other favourable or unfavourable causes, during the time of pregnancy, must have a great influence on the whole formation and life of the being. This is confirmed by experience. The child's state of health, and the greater or less strength of its constitution are determined, in a particular manner, much more according to the condition of the mother, than that of the father. By a weakly father a robust child can always be produced, provided the mother have a sound and vigorous body. The substance of the father is, as it were, in her ennobled. On the other hand, the strongest man will never obtain a lively, healthy child from a mother who is weak and sickly.

With regard to the protection of the child during pregnancy against all dangers and hurtful effects, we find a regulation which displays the provident care of Divine Wisdom. Though the most intimate connexion subsists

between it and the mother, and though for nearly a year it forms a part of her, and partakes of her nourishment and juices, it is secured not only against accidental injuries by its situation and floating in a watery element, but also against moral and nervous impressions by there being no nervous connexion between it and the mother. We have, therefore, numerous instances of the mother dying, while the child continued alive. Nature has even conjoined with this state a certain immunity from sickness; and it is a principle established by experience, that a pregnant woman suffers much less from infectious and other causes of disease; and that a female has never a greater probability of living than while in that condition.

So much have mankind been, at all times, impressed with the importance of this period, that, among ancient nations, a pregnant woman was considered as a person sacred and secure from injury, and that every one who hurt or ill-treated her was thought deserving of double punishment. Our age, unfortunately, has here made a difference, both in a physical and a political view. The weak nerved, sensible, and delicate constitution of the female sex, at present, renders the preservation of the fruit in the mother's womb much more uncertain and dangerous. The womb of the mother is no longer a place of safety, the undisturbed atelier of Nature. Through that unnatural sensibility which is now so peculiar to a great part of our women, they have become far more susceptible of a thousand prejudicial effects, a multitude of passions; and the fruit suffers by every mental affection, every alarm, every cause of disease, and even by the most trifling accident. It is, therefore, impossible that a child, in a place where its formation and expansion are every moment interrupted and disturbed, should acquire that degree of perfection and strength to which it was destined. And yet little attention do mankind pay, either in a civil or political point of view, to the importance of this condition. Who thinks, at present, on the sacredness of a pregnant woman; or, who regulate their be-

haviour to her, by reflecting that the life, or at any rate the physical and moral formation, of a future being may thereby be endangered? Nay, how few pregnant women take that care of this condition which it deserves! and how few are able to deny themselves that pleasure and those gratifications which may be attended with mischief!

In my opinion, therefore, the following rules may, with great propriety, be founded on these observations:

1st. Such highly weak-nerved and sensible people ought never to marry; if not through a regard for themselves, and on account of the sufferings which they may thereby avoid, at any rate out of compassion for the miserable race of which they would be authors. In the education of daughters, people above all things should be attentive to guard against this unfortunate sensibility; because, from a regard for the complexion, for appearance, and a multitude of other points which belong merely to etiquette, a contrary conduct is observed. And lastly, it is the duty of every man, when he chooses a wife, to be particularly careful that her nervous system be not too irritable. Should this be the case, the principal object of marriage, to produce sound and robust children, is entirely lost.

2nd. Women ought to pay more attention to this period, and to observe a good moral as well as physical regimen; for they have then in their power the degree of perfection or imperfection, of the good or bad structure of the mind and body of their child.

3rd. Men in general should have respect for a pregnant woman in this point of view; and, as the depositary of a human being during its state of formation, treat her with every care, tenderness, and attention. Every husband, in particular, ought to make this a duty; and to reflect that he thereby watches over the life and health of his offspring, and deserves, in the fullest sense, the title of *father*.



## CHAPTER II.

## Prudent physical education.

THE physical treatment during the two first years of existence is, in particular, a very important circumstance in regard to the prolongation of life. That period ought properly to be considered as a continued generation. The first part only of formation and expansion takes place in the mother's womb; the second, which is no less important, takes place externally during the two first years of life. A child comes into the world as a being only half finished. The most important and delicate expansion, that of the nerves and organs of the soul, the organs of respiration, the muscular system, the teeth, the bones, the organs of speech, and all the other parts, both in regard to form and structure, now follows. One may readily comprehend, therefore, what influence the different circumstances, under which this continued process of formation and expansion is carried on, whether they act so as to impede, derange, and weaken, or to accelerate, must have on the perfection and duration of life. A foundation may certainly be here laid for slow or rapid consumption; for a body exposed to more or to fewer dangers.

All the precepts and rules respecting this period may be reduced to the following principles:—

1st. All the organs, but in particular those on which health and the duration of physical as well as spiritual life chiefly depend, must be completely formed, exercised, and brought to the highest degree of perfection. Among these I reckon the *stomach*, the *lungs*, the *skin*, the *heart*, the *vascular system*, and the *organs of thought*. A foundation may be laid for good lungs, by pure open air; and after-

wards, by speaking, singing, running; for a sound stomach by wholesome food, easy of digestion; but neither too strong and stimulating, nor too highly seasoned: for a sound skin, by cleanliness, washing, bathing, pure air, a temperature, neither too hot nor too cold, and, afterwards, by exercise: and for a strong heart and vessels, by all the above means; in particular, by wholesome nourishment, and afterwards by bodily motion.

2nd. The successive expansion of the physical and spiritual powers must be properly supported; and be neither impeded, nor too much promoted. Attention must be always paid to an uniform distribution of the vital power; for harmony and equality in the motions are the foundation of health and life. Bathing and free air will contribute to this in the beginning, and afterwards bodily exercise.

3rd. The sensation of the body in regard to disease, that is to say, its susceptibility of the causes of disease, must be hardened and blunted; as also its sensation of cold and heat, and afterwards that of small irregularities and fatigue. By these means two advantages will be gained; vital consumption, by the sensibility being moderated, will be lessened; and the derangement of it by diseases will be guarded against.

4th. Every cause and germ of disease in the body must be removed and banished; such as accumulations of phlegm, obstructions of the mesentery, and sharp acrid humours; faults which may arise from external hurts and impressions, too confined bandages, want of strict cleanliness, &c.

5th. The vital power itself must be always sufficiently nourished and strengthened, particularly by means of fresh air; and the healing power of nature must, above all things, be supported from the beginning, because it is the principal means which lies in ourselves for rendering the causes of disease ineffectual. This may be done chiefly by not accustoming the body at first too much to artificial assistance; otherwise Nature will be so used that

she will depend on foreign aid, and at length lose altogether the power of assisting herself.

6th. The whole operation of life and vital consumption must not at first be put into too great activity but be preserved in a moderate state; by which means its tone may be regulated for the whole life, and also for a slow and a long life.

The following simple means, which, in my opinion, form the principal part of physieal education, may serve for accomplishing what is contained in the above precepts.

We must here, however, distinguish two periods. The *first period* is from birth to the end of the second year; and the chief points to be observed are as follow :—

I. The nourishment must be good, but suited to that tender age; easy of digestion, rather fluid than solid; fresh and sound; nutritive, but not too strong, stimulating, or heating.

Nature, here, is our best guide; as she has destined milk to be the earliest food of man. Milk possesses all the above qualities, in the most perfect degree: it is full of nutritive substance, but mild and nourishing, without heating or stimulating: it holds a mean rank between animal and vegetable food; unites the advantage of the latter, that of being less stimulating than flesh, with all the advantages of flesh: that is to say, its being already assimilated to us by preparation in a living animal body, which makes it more easily assume the character of our substance: and, in a word, it is altogether suited to the nature of an infant.

The body of a child lives quicker than that of a full-grown man, and changes oftener its component parts. Besides, it requires nourishment, not merely for its support, but for its continual growth, which is never so rapid during the whole course of life as the first year. It is evident, therefore, that it has occasion for abundance of concentrated nourishment; but as its powers of digestion are weak, it is not able to prepare and assimilate food that is solid or heterogeneous to its nature; such, for example,

as vegetables. Its nourishment must then be fluid, and already animalized; that is, be prepared and rendered like its nature in another animal body. It has, however, a great degree of irritability and sensibility; so that a small irritation, which a grown-up person would scarcely feel, may in it produce an artificial fever, or the cramp and convulsions. The nourishment of a child must on this account be mild, and exactly suited to its irritability.

I consider it, therefore, as one of the first laws of Nature, and a principal ground for a long and healthy life, *that a child should be nourished, during the whole of the first year, by the milk of its mother, or of a sound nurse.*

From this law of Nature people in modern times make many deviations, which undoubtedly have the most prejudicial influence on the duration of life and health, and which I must therefore here mention.

Some have attempted to nourish and educate children by slimy vegetable substances. These sometimes, and in particular cases, may be useful, but, without any other food, are certainly hurtful; for they do not afford sufficient nourishment, and, what is worse, do not become properly animalized, and retain still a part of their sour vegetable nature in the body of the child. Such food, therefore, produces weak meagre children, continually tormented with acidities at the stomach, sour eructations, phlegm, obstructions in the glands, and the scrofula.

Still worse is the custom of nourishing children with flour-pap; for this food, besides the disadvantage of its acid nature, as being a vegetable aliment, obstructs the tender lacteal vessels, and those of the mesentery; and lays a certain foundation for the scrofula and consumption of the lungs.

Others, to avoid these evils, and partly through anglo-mania, make choice of flesh nutriment for their children, and give them wine, beer, and other things of the like kind. This prejudice deserves in particular to be reprobated, because it seems daily to gain more advocates, because it agrees with the exciting method so much

approved at present, and because the mischief it occasions is not always sufficiently attended to by physicians. People say, in common, flesh is strengthening; and that is precisely what a child requires. But the grounds on which I found a contrary opinion are as follow:—There must always be a certain relation between the nourishment and the body to be nourished, between the irritation and the irritability. The greater the irritability, the stronger is the effect which may be produced by a small irritation; the smaller the former, the effect of the latter will be so much weaker. Now, this irritability in human life is always in an inverse ratio to the age. In the first period of life it is strongest; and it every year becomes weaker, till it is entirely extinguished by old age. We may therefore say that milk, in regard to its irritating and strengthening power, is as exactly proportioned to a child, as flesh to an adult, or wine to an old man. But if one give flesh nourishment to a child too soon, one gives it an irritation like that occasioned by wine to grown-up persons, which is much too strong, and not destined for it by Nature. The consequences are, that a kind of artificial fever is produced and kept up in the child, that the circulation of the blood is accelerated, its warmth increased, and that a habit with a tendency to violent inflammatory disorders is created. Such a child has a full blooming look; but the slightest cause may occasion a violent commotion in the blood; and when it arrives at the period of teething, or if attacked by the smallpox, or any other kind of fever, when the tendency of the blood to the head is so strong, one may rest assured that some inflammatory disorder, convulsions, or apoplexy will ensue. People in general believe that one can die only through weakness; but one may die also through too much strength and irritation; and this may take place by the injudicious use of irritating things. Besides, by giving such strong nourishment to children, one accelerates, from the beginning, their vital operation and consumption; the whole system and organs are put into too great activity; a foundation is



originally laid for a more vigorous but a quicker life ; and, under the idea of strengthening, one really establishes the principal cause of a short life. One also ought not to forget that, by this early use of flesh nourishment, the expansive process of teething, and afterwards that of manhood, are hastened too much, a great means of shortening life ; and that it has a bad influence on the whole character. All carnivorous men and animals are violent, cruel, and passionate ; while, on the other hand, the use of vegetable food inclines men more to mildness and humanity. This I have often found confirmed by experience. Children who had used flesh too early, and in too great quantity, became always strong men, but passionate, violent, and brutal ; and I very much doubt whether such a disposition be fortunate, either for the individuals, or for mankind in general. There are certainly cases in which the early use of flesh nourishment may be useful, particularly for weak children, educated without the mother's milk, and who suffer from acidities ; but it is then to be considered as a medicine, and must be regulated and the quantity determined by a physician. What I have said respecting flesh is applicable still more to wine, coffee, chocolate, spiceries, and the like. It is, therefore, a very important rule, in regard to the physical education of children, that a child, during the first half-year, should taste no flesh, no flesh soups, no beer, and no coffee ; but be nourished merely by the milk of its mother. In the second half-year, light soups may be admitted ; but flesh itself ought never to be given till the teeth have appeared,—that is, till the end of the second year.

But as many insuperable circumstances may occur to prevent a child from being educated in the natural manner in which it ought ; such, for example, as the nervous weakness of the mother, or her sickly asthmatic state, by which the child would lose more than it could gain in regard to its vital duration ; and if a sound nurse cannot be procured, the melancholy necessity then arises of educating the child artificially ; and though this method is always

injurious, in some measure, to the health as well as duration of life, it may be rendered less prejudicial by observing the following precepts:—Let the child, at least, where it is possible, derive its nourishment from its mother for the first fortnight, or month. One cannot imagine of how much benefit this is in the first period. As the best substitute for the mother's milk, sheep or ass's milk may be then given; but always immediately after it has been milked, and while it yet retains its natural warmth. It would be still better to let the child suck the animal. Should this be impracticable, let the child have a mixture of cow's milk and water, always lukewarm; and fresh milk, at least once every day. A remark of some importance here is, that one must not warm the milk, (otherwise it assumes a certain character of acidity,) but only the water which is added to it. With this artificial nourishment it is necessary to give, somewhat sooner, pap made of biscuit, pounded very fine, barley, sago, or saloop, boiled with half milk and water; also light, but not fat, bouillis and egg-water, that is, the yolk of an egg beat up in a pint of water and mixed with a little sugar. Potatoes during the two first years are prejudicial. However little I consider them unhealthful in general, they are certainly too hard of digestion for so tender a stomach, as they are of a clammy viscid nature.

II. Let the child, after the third week, (earlier in summer, but later in winter,) enjoy the free air every day, and continue this practice without any interruption on account of the weather.

A perfect similarity prevails here between children and plants. Give the latter the richest nourishment and warmth, but deprive them of air and light, they will become pale, withered, and stunted, and at length die. The use of pure free air, and of the vital component parts which it contains, is a nourishment as indispensably necessary for the support of life as eating and drinking. I have known people who remained weak and pale-coloured throughout their whole lives, because they were nurtured during their first years

like plants in a hothouse ; whereas, on the other hand, the daily use of light and free air is the only means to produce a blooming complexion, and to communicate strength and energy sufficient to last one's whole life. This advantage also is of great importance, that a person is thereby enabled afterwards to bear, without injury, variations of heat and cold.

It is most beneficial when the child enjoys the free air in a place covered with grass and trees, at a little distance from one's habitation. The enjoyment of air in the streets of a city is far less wholesome.

III. Let the body of the child be washed daily with fresh cold water : a rule indispensably necessary for cleansing and invigorating the skin ; for strengthening the whole nervous system ; and for laying the foundation of a sound and long life.

This practice of washing ought to commence at the birth ; but during the first week lukewarm water must be used ; cold water ought to be employed afterwards, and it is of great importance that it be fresh drawn from a spring or running stream ; for water contains fixed air which evaporates when it has stood any time, and which communicates to it a very strengthening quality. The child, however, must be washed speedily ; and its body ought to be immediately rubbed and dried ; for slow bathing cools, but speedy friction warms. Lastly, it should not be washed when it just comes from bed, nor, in general, while it perspires.

IV. Every week it ought to be bathed once or twice in tepid water, warmed to the temperature of new milk, or from 86° to 91° of Fahrenheit's thermometer.

This excellent practice unites in it such an extraordinary number of virtues, and is at the same time so suited to the age of infancy, that I may call it a real arcanum for bringing to perfection and forming the future man. Cleansing and invigorating the skin, free but not accelerated expansion of the powers and organs, uniform circulation, harmonious acting in concert of the whole (the

foundation of health), strengthening the nervous system, moderating the too great irritability of the vessels and too rapid vital consumption, purifying the juices, are all its effects; and I can, with confidence, assert that I am acquainted with no assistant means of physical education which possess in so high a degree, every requisite for laying the foundation of a long and healthful life. The bath must not consist entirely of boiled water, but of water fresh drawn from a well, to which some hot water, sufficient to bring it to a lukewarm temperature, has been added. In summer that water is best which has been warmed by the rays of the sun. The bathing should be continued, at this period of age, a quarter of an hour each time, and afterwards longer. It ought never to be used during the first hour after eating.

V. Be careful not to keep a child too warm: that is, avoid warm rooms, warm beds, and clothing. Keeping too warm increases irritability in a great degree, and gives occasion also to speedier vital consumption: it debilitates and relaxes the vessels, accelerates expansion, weakens and deadens the skin, disposes the body to continual perspiration, and thus renders it always liable to injury from cold. I consider it of great importance to accustom children to sleep from their infancy on mattresses made of horsehair, chaff, or moss. These never acquire too much heat; have more elasticity, and prevent too great tenderness. They oblige the child also, as they do not yield to pressure, to lie straight and extended; by which means they guard against overgrowth, and the premature excitement of their organic system.

VI. Let the clothing be wide, in no manner confined; and made of some substance not too warm to check perspiration, such as fur, but of stuff that can be often renewed or washed. Cotton is the best; and during the severity of winter, light woollen stuffs. Avoid all close bandages, stiff stays, small shoes; for these may give occasion to diseases which will afterwards shorten life. The head, from the fourth to the eighth week, must be



kept quite bare; but this ought to be determined by the season of the year.

VII. Pay the utmost attention to cleanliness; that is, change the shirt daily; the clothing every week: the bed-clothes every month; and remove every cause of noxious evaporation; in particular, do not suffer too many people to be in the nursery; and allow no clothes to be dried, or any foul linen to remain in it. Cleanliness for children is one-half of their life: the cleaner they are kept the more will they prosper and thrive. By cleanliness alone, with very moderate nourishment, they may in a short time be rendered strong, vigorous, and lively; whereas, without cleanliness, even with the richest nourishment, they will continue sickly and weak. Want of attention to this precept is the cause why so many children pine away and are consumed without any visible reason. Ignorant people imagine that they must be bewitched, or under the influence of some evil spirit; but dirt alone is the demon by which they are tormented, and which in the end will undoubtedly destroy them.

The *second period* is from the end of the second to the twelfth or fourteenth year; and I here recommend the following precepts:—

I. Let the rules respecting cleanliness, washing with cold water, bathing, light clothing, and living in free air be observed according to the foregoing directions.

II. The food must not be too delicate and artificial, or too coarse. It will be best in this period to allow children a sufficient mixture of flesh and vegetables; and to accustom them to everything, but neither to eat too much nor too often. People may rest assured that, if they put in practice all the other rules respecting physical education, bodily exercise, and cleanliness, neither delicate nor coarse food will be requisite to make a child healthy. For the truth of this observation we need only look at the children of rustics, who, without being fed according to medical precepts, are perfectly strong and sound. But one, indeed, ought not here, as is too often



the case, to give a child rustic fare, and at the same time to indulge it with a soft feather-bed, to confine it to the house, and accustom it to idleness; nor to employ the cold bath, while a child, in other respects, is enervated by most delicate treatment. I cannot repeat too often what I have before said, that a principal point of education is to preserve an uniform tone, and not to unite two opposite methods of management. It will be quite sufficient if a child, during this period, is allowed four meals every day. The only things which it ought not to touch are spiceries, coffee, chocolate, seasoning, confections, fat heavy puddings and cheese.\* For drink nothing is better than water. In such places only where Nature has denied pure spring water, I allow children to be accustomed to beer.

III. As bodily exercise now becomes an important part of physical education, let a child spend the greater part of the day in gymnastic sports of every kind, and in the open air, where they are always most serviceable. This strengthens in an incredible degree; gives peculiar activity to the body, uniform diffusion to the powers and juices; and guards, in the surest manner, against faults in the growth and formation.

IV. The powers of the mind must not be exerted too early. It is a great prejudice that people imagine they cannot make a child begin to learn too soon. But it is certain that a child may begin too soon, when that period is chosen during which Nature is still employed in forming the bodily powers and organs, and has need of all their strength for that purpose. This period extends to the seventh year; and if a child be obliged at an earlier age to apply to learning, and be confined in a sitting posture, its body will be deprived of the noblest part of its powers, which must be now wasted by the business of thinking;

\* I cannot conceive Hufeland's reasons for objecting to cheese, unless, perchance, it were less well made in the eighteenth than in the nineteenth century. I regard it as a wholesome article of diet for children, and a good compromise between meat and vegetable diet.  
—EDITOR.

and the consequences will be, a checking of the growth, imperfect formation of the limbs, muscular weakness, bad digestion, corrupt juices, the scrofula, and a preponderance of the nervous system in the whole machine, which will become burdensome during life, by nervous affections, the hypochondriasis, and evils of the like kind. Much, however, will here depend on the difference of constitution, and the greater or less vigour of mind; but I earnestly request that parents and others will in this respect pursue a method directly contrary to that usually followed. If a child show an early disposition for thinking and learning, one ought, instead of straining its powers the more, as is commonly the case, to prevent it from application till a later period; for such premature ripeness is generally a disease, at any rate an unnatural state, which ought rather to be checked than promoted, unless one wishes to breed up a *monster of erudition* rather than a sound healthful man.

I must here remark, that a great many of the evils which attend too early study, may not arise so much from exerting the powers of the mind, as from confinement and sitting, and from the corrupted air of schools in which children are taught. At any rate, the weakening is thus doubled. I am fully persuaded that it would be much less injurious if children were made to perform their school business in the open air during the fine seasons; and here, at the same time, would they have before them the book of Nature, which, supposing that the pupils are capable of reading and understanding it, is much more fit and proper for their first instruction than all the books that ever were written or printed.

## CHAPTER III.

## Active and laborious youth.

It appears that all those who attained to a great age were men who, in their youth, had been much accustomed to labour and fatigue; such as soldiers, sailors, and day-labourers. I shall here mention only *Mittelstädt*, that veteran of 112, who in his fifteenth year was a servant, and in his eighteenth a soldier; and who was present in all the Prussian wars, from the commencement of the monarchy.

A youth spent in that manner, becomes the foundation of a long and a strong life, two ways: partly by giving the body that degree of strength and solidity which is necessary for its duration; and partly by making that possible which principally contributes to promote happiness and longevity, advancement to a better and more agreeable situation. He who in his youth has every convenience and enjoyment in abundance hath nothing more to expect; he is deprived of the best means of exciting and preserving the vital power, hope, and the prospect of a better condition. If he be condemned then with increasing years to poverty and difficulties, he finds himself doubly oppressed; and the duration of his life must be necessarily shortened. But in the transition from a state of misery to one more fortunate, lies a continual source of new joy, new vigour, and new life. In the like manner, the passage, with increasing years, from a raw, cold climate, to one more mild, contributes much to prolong life; as also the change from a state of labour to one more convenient and agreeable.

## CHAPTER IV.

Abstinence from physical love in youth, and a too early assumption  
of the married state.

He who in Pleasure's downy arms  
Ne'er lost his health or youthful charms,  
A hero lives; and justly can  
Exclaim, "In me behold a man!"

He prospers like the slender reed  
Whose top waves gently o'er the mead;  
And moves, such blessings virtue follow,  
In health and beauty an Apollo.

That power divine, which him inspires,  
His breast with noblest passions fires;  
These heavenwards soar with eagle-flight,  
And spurn the cold, dark realms of night.

So full of majesty, a god,  
Shall earth alone be his abode?  
With dignity he steps, he stands,  
And nothing fears; for he commands.

Like drops drawn from the crystal stream,  
His eyes with pearly brilliance beam;  
With blushing signs of health o'erspread,  
His cheeks surpass the morning's red.

The fairest of the female train  
For him shall bloom, nor bloom in vain:  
O happy she whose lips he presses!  
O happy she whom he caresses!      BÜRGER.

THERE was a time when the German youth never thought of intimacy with the other sex till their twenty-fourth or twenty-fifth year; and yet nothing was then known of the pernicious consequences of this chastity, nor of many other imaginary evils of which people now dream: but these youths, increasing in strength as well as growth,

became men who, by their size, excited the astonishment even of the Romans.

People now leave off at the period when these began. They imagine they can never soon enough throw off their ephastity; and young persons, long before their bodies are completely finished, begin to waste those powers which are destined for a higher use. The consequences are evident. These men become incomplete, half-formed beings; and at the period when our ancestors began to employ those powers, they, in them, are generally exhausted: they feel nothing but dejection and misery in their weakness; and a stimulus of the utmost importance for seasoning life is to them for ever lost.

It is incredible how far prejudice in this respect may be carried, especially when it flatters our inclination. I once knew a man who seriously believed that there was no poison more prejudicial to the human body than continence, and the consequence was, that he was an old man in his twentieth year, and in his twenty-fifth died of old age.

The present age has fallen so much into the taste of the times of chivalry, that all romances must now assume that form in order to please; and one, indeed, cannot help admiring the great, noble, and resolute manner of thinking and acting of these old Germans. It appears that the more sensible we are how far we have degenerated from them, the more we are excited by their example, and the more we are inflamed with a desire to imitate their conduct. But what a happiness would it be if we did not think merely of the object, but of the means to obtain it. That by which these people acquired so much courage, so great powers both of body and mind, their bold, firm, and resolute character, which made them *real men* in the utmost sense of the word, was, in particular, their strict continence. The youth of these men was destined to great exploits and undertakings, not to voluptuousness and dissipation; the physical propensity to love did not among them sink into mere animal enjoy



ment, but was exalted to a moral incitement to noble and heroic actions. Each bore in his heart the image of his beloved object, whether real or imaginary; and this romantic love, this indissoluble attachment, was the shield of his continence and virtue, strengthened the powers of his body, and communicated to his mind courage and unalterable resolution, by continually directing its attention to his fair one smiling to him at a distance, and whose favour could be gained only by glorious achievements. However romantic these notions may be, I find, on closer examination, great wisdom in this use of physical love, one of the strongest motives by which human nature is actuated. How widely different has the case become among us! This propensity, which by prudent management may be made the germ of the most exalted virtue, of the greatest heroism, has degenerated into whining sensibility, or mere sensual gratification, which people enjoy prematurely, and even to satiety; the passion of love, which in those periods was a security against dissipation, is at present the source of the greatest; the virtue of chastity, the principal foundation without doubt of moral firmness and manliness of character, has become a subject of ridicule, and is decried as old-fashioned pedantry; and what ought to be the last and sweetest reward of toil, labour, and danger, has become a flower which every stripling crops by the way. Why does Nature excite in our bosom this sighing after union, this all-powerful, irresistible propensity to love? Not, truly, to afford subjects for romance, or to make a figure in the ecstatic raptures of poetry; but that it may serve as an indissoluble band to unite two hearts: to lay the grounds for a happy generation; and that, by this magic tie, our existence may be connected with the first and the most sacred of all duties. How fortunate would it be were we here to imitate the ancient method, and never to pull the fruit till we had planted!

At present, we hear a great deal of strength and strong men: but I will believe nothing of it as long as I see that

they have not strength enough to subdue their passions; for, that is the only cause of triumph, as well as the only sign of mental strength; and chastity is the school in which youth ought to be exercised, and to form themselves for becoming strong men.

We in general find, in the old world, that all those from whom anything great or glorious was expected, were obliged to restrain physical love. So much were people then convinced that Venus absorbs the whole powers of man, and that those given up to dissipation could never attain an exalted position.

## CHAPTER V.

## Happy married state.

It is one of the falsest and most pernicious of prejudices, that marriage is an invention merely political and conventional. It is much rather one of the most essential parts of the destination of man, both for the individual and the whole; and an establishment absolutely necessary for the education of mankind. By marriage I understand, a firm, sacred union of two persons, for the purpose of mutual support, and for giving origin to and educating children. And, in this intimate union, founded on so important an object, lies, in my opinion, the principal grounds of domestic as well as public felicity; since, in the first place, it is indispensably requisite for the moral perfection of mankind. By this close connexion of two beings, this association of one's interest with that of another, is selfishness, the most dangerous enemy of all virtue, best subdued; and man always more inclined to humanity and compassion for his fellow-creatures, and still brought nearer to his true state of moral exaltation. His wife and his children form an indissoluble bond, which unites him to the rest of mankind, and to the good of the whole: his heart is always warmed by the sweet sensation of matrimonial and parental tenderness, and defended from that deadening coldness which so easily overcomes the man who leads a solitary life; and the endearing cares of a father impose on him duties which accustom him to order, industry, and habits of prudence. His passion for the sex is thereby ennobled, and, from a mere animal instinct, converted into one of the highest moral motives of action

and violent passions, ill-humour, and bad customs, are thus best eradicated. Hence arises a very fortunate influence over the whole and the general good; so that I can, with perfect confidence, affirm, that happy marriages are the most important supports of a state, and of public peace and felicity. A bachelor always remains a mere egotist; restless and unsteady, a prey to selfish humours and passions; less interested for mankind, for his country and the state, than for himself. He is overcome by a false sentiment of liberty, which prevents him from entering into wedlock; and this sentiment is still nourished and strengthened by the condition in which he lives. What can tend more to produce a fondness for change, sedition, and revolutions, than an increase of unmarried citizens? How different is the ease with the married! That dependence on the other half, necessary in marriage, accustoms one continually to a dependence on the laws; regard for one's wife and children obliges one to be regular and industrious: by his children, a man is attached closely to the state; its interest and prosperity by these means become his own; or, as Bacon expresses it, he who is married and has children, has given pledges to the state: he is a bondsman, a true citizen, and a real patriot. But, what is still more, a foundation is here laid, not only for the happiness of the present generation, but for that of the future also; as it is the matrimonial union only that produces to the state good moral citizens, accustomed from their youth to regularity and an observance of their duty. One must not imagine that the state itself can supply this formation of the manners, this education which all-wise Nature hath connected with the hearts of a father and a mother.

I shall now return to my principal object, to point out the beneficial influence which marriage has on the physical good of mankind. With the utmost propriety may it be classed among those means which tend to prolong life; and my reasons are as follow:—

1st. Marriage is the only means to regulate love, and to direct it to its proper object. It equally prevents dissipa-

tion, and cold and unnatural indifference. However much I have recommended continence in youth, convinced that it is indispensably necessary to promote long life, I am convinced also that there are certain years of manhood when it is as prejudicial to suppress by violence the propensities of nature, as it is to yield to them before the proper period. It is required by the general law of harmony. No power in us must remain totally unexpanded; each must be exercised in moderation.

2nd. We are told by experience, that *all those who attained to a very remarkable age were married.*

3rd. The married state promotes *domestic* joy, which is the purest, the most uniform, and the least wasting of all. It is undoubtedly that which is best suited to physical as well as moral health, and which can, with the greatest certainty, preserve the mind in that happy mean state most favourable to longevity. It tends to moderate overstrained hope and enthusiastic speculation, as well as excessive care. Everything, by the participation of another being, by the intimate connexion of our existence with that of another, is rendered milder and more supportable. To this may be added, that tender charge, that heaven on earth, secured by nothing so much as wedded love, which lies in the possession of healthful and well-educated children; that actual renovation, reserved for us by their company, of which Cornaro, at the age of eighty, has given so affecting a picture.

We go out of the world by the same changes almost as those by which we enter it. We begin as children; as children we leave off. We return, at last, to the same weak and helpless condition as our first. We must have people to lift us, to carry us, to provide us nourishment, and even to feed us. We again have need of parents. And how wise the establishment! We find them again in our children, who now take delight in repaying a part of that kindness which we showed to them. Children now step, as it were, into the place of parents, while our weakness transposes us into the place of children. The



venerable oak, on the other hand, does not enjoy the benefit of such a wise regulation. The old decayed trunk stands alone and forgotten, and in vain endeavours to procure from foreign aid that support and assistance which can be the work only of natural affection and the bonds of nature.

Do what thou canst, exert thy utmost power ;  
Yet still alone thou'lt stand till thy last hour,  
When Nature's hand, almighty and divine,  
To the grand whole thy lifeless mass shall join.

SCHILLER.

## CHAPTER VI.

## Sleep.

I HAVE already shown that sleep is one of the wisest regulations of Nature, to check and moderate, at fixed periods, the incessant and impetuous stream of vital consumption. It forms, as it were, stations for our physical and moral existence; and we thereby obtain the happiness of being daily re-born, and of passing every morning, through a state of annihilation, into a new and refreshed life. Without this continual change, this incessant renovation, how wretched and insipid would not life be; and how depressed our mental as well as physical sensation! The greatest philosopher of the present age says, therefore, with justice: *Take from man hope and sleep* and he will be the most wretched being on earth.

How unwisely then do those act who imagine that by taking as little sleep as possible they prolong their existence. They will obtain their end neither in *intensive* nor *extensive* life. They will, indeed, spend more hours with their eyes open; but they will never enjoy life in the proper sense of the word, nor that freshness and energy of mind which are the certain consequences of sound and sufficient sleep, and which stamp a like character on all our undertakings and actions.

But sufficient sleep is necessary, not only for intensive life, but also for extensive, in regard to its support and duration. Nothing accelerates consumption so much, nothing wastes us so much before the time, and renders us old, as a want of it. The physical effects of sleep are, that it retards all the vital movements, collects the vital

power, and restores what has been lost in the course of the day; and that it separates from us what is useless and pernicious. It is, as it were, a daily crisis, during which all secretions are performed in the greatest tranquillity, and with the utmost perfection.

Continued watching unites all the properties destructive of life; incessant wasting of the vital power and of the organs, acceleration of consumption, and prevention of restoration.

We must not, however, on this account, believe that too long continued sleep is one of the best means for preserving life. Long sleep accumulates too great an abundance of pernicious juices, makes the organs too flaccid and unfit for use, and in this manner can shorten life also.

In a word, no one should sleep less than six, nor more than eight hours. This may be established as a general rule.

To those who wish to enjoy sound peaceful repose, and to obtain the whole end of sleep, I recommend the following observations:—

1st. The place where one sleeps must be quiet and obscure. The less our senses are acted upon by external impressions, the more perfectly can the soul rest. One may from this see how improper the custom is of having a candle burning in one's bed-chamber during the night.

2nd. People ought always to reflect, that their bed-chamber is a place in which they pass a great part of their lives; at least they do not remain in any place so long in the same situation. It is of the utmost importance, therefore, that this place should contain pure sound air. A sleeping apartment must, consequently, be roomy and high; neither inhabited nor heated during the day; and the windows ought always to be kept open, except in the night-time.

3rd. One should eat little, and only cold food for supper, and always some hours before going to bed.

4th. When abed, one should lie not in a forced or constrained posture, but almost horizontal; the head ex-

cepted, which ought to be a little raised. Nothing is more prejudicial than to lie in bed half-sitting. The body then forms an angle; circulation in the stomach is checked, and the spine is always very much compressed. By this custom one of the principal ends of sleep, a free and uninterrupted circulation of the blood, is defeated; and, in infancy and youth, deformity and crookedness are often its consequences.

5th. All the cares and burden of the day must be laid aside with one's clothes; none of them must be carried to bed with us; and, in this respect, one by custom may obtain very great power over the thoughts. I am acquainted with no practice more destructive than that of studying in bed, and of reading till one falls asleep. By these means the soul is put into too great activity, at a period when everything conspires to allow it perfect rest; and it is natural that the ideas, thus excited, should wander and float through the brain during the whole night. It is not enough to sleep physically; man must sleep also spiritually. Such a disturbed sleep is as insufficient as its opposite,—that is, when our spiritual part sleeps, but not our corporeal: such, for example, as sleep in a jolting carriage on a journey.

6th. One circumstance, in particular, I must not here omit to mention. Many believe that it is entirely the same if one sleeps these seven hours either in the day or the night time. People give themselves up, therefore, at night, as long as they think proper, either to study or pleasure; and imagine that they make everything even when they sleep in the forenoon those hours which they sat up after midnight. But I must request every one, who regards his health, to beware of so seducing an error. It is certainly not the same, whether one sleeps seven hours by day or by night; and two hours sound sleep before midnight are of more benefit to the body than four hours in the day. My reasons are as follow:—

That period of twenty-four hours, formed by the regular revolution of our earth, in which all its inhabitants par-

take, is particularly distinguished in the physical economy of man. This regular period is apparent in all diseases; and all the other small periods, so wonderful in our physical history, are by it in reality determined. It is, as it were, the unity of our natural chronology. Now, it is observed, that the more the end of these periods coincides with the conclusion of the day, the more is the pulsation accelerated: and a feverish state is produced, or the so called evening fever, to which every man is subject. The accession of new chyle to the blood, may, in all probability, contribute something towards this fever, though it is not the only cause; for we find it in sick people who have neither eat nor drunk. It is more owing, without doubt, to the absence of the sun, and to that revolution in the atmosphere which is connected with it. This evening fever is the reason why nervous people find themselves more fit for labour at night than during the day. To become active, they must first have an artificial stimulus; and the evening fever supplies the place of wine. But, one may easily perceive that this is an unnatural state; and the consequences are the same as those of every simple fever: lassitude, sleep, and a crisis, by the perspiration which takes place during that sleep. It may with propriety therefore be said, that all men every night have a critical perspiration, more perceptible in some, and less so in others, by which whatever useless or pernicious particles have been imbibed by our bodies, or created in them, during the day, are secreted and removed. This daily crisis, necessary to every man, is particularly requisite for his support; and the proper period of it is when the fever has attained to its highest degree, that is, the period when the sun is in the nadir, consequently midnight. What do those, then, who disobey this voice of Nature which calls for rest at the above period, and who employ this fever, which should be the means of secreting and purifying our juices to enable them to increase their activity and exertion? By neglecting the critical period, they destroy the whole crisis of so much



importance; and, though they go to bed towards morning, cannot certainly obtain, on that account, the full benefit of sleep, as the critical period is past. They will never have a perfect, but an imperfect crisis; and what that means is well known to physicians. Their bodies also will never be completely purified. How clearly is this proved by the infirmities, rheumatic pains, and swollen feet, the unavoidable consequences of such lucubration.

Besides, the eyes suffer more by this custom; for one labours then the whole summer through with candle-light, which is not necessary for those who employ the morning.

And, lastly, those who spend the night in labour, and the morning in sleep, lose that time which is the most beautiful and the best fitted for labour. After every sleep we are renovated in the properest sense of the word; we are, in the morning, always taller than at night; we have then more pliability, powers and juices; in a word, more of the characteristics of youth; while, at night, our bodies are drier and more exhausted, and the properties of old age then prevail. One, therefore, may consider each day as a sketch, in miniature, of human life, in which the morning represents youth; noon, manhood; and evening, old age. Who would not then employ the youthful part of each day for labour, rather than begin his work in the evening, the period of old age and debility? In the morning, all nature appears freshest and most engaging; the mind at that period is also clearest, and possesses most strength and energy. It is not, as at night, worn out, and rendered unequal, by the multifarious impressions of the day, by business and fatigue: it is then more original, and possesses its natural powers. This is the period of new mental creation, of clear conceptions and exalted ideas. Never does man enjoy the sensation of his own existence so purely and in so great perfection as in a beautiful morning. He who neglects this period, neglects the youth of his life.

All those who attained to a great age were fond of

early rising ; and *John Wesley*, the founder of the Methodists, an original and singular man, was so convinced of the necessity of this custom, that he made it a point of religion to get up early, and by these means lived to the age of eighty-eight. His motto, which as a true maxim of life I shall here recommend, was :

To go early to bed, and early to rise,  
Will make a man healthy, wealthy, and wise.

## CHAPTER VII.

## Bodily exercise.

“WHEN I consider the physical structure of man,” said the great *Frederick*, “it appears to me as if Nature had formed us rather to be postillions than sedentary men of letters.” And, without doubt, though this expression be strong, it contains a great deal of truth. Man is, and always remains, a middle being, that incessantly fluctuates between the brute and the angel; and as much as he would deviate from his higher destination, did he continue the mere animal, as much does he offend against his present destination when he wishes to be merely spirit—to think only and to perceive. He must exercise his animal and spiritual powers in the like degree, if he be desirous to accomplish perfectly the object for which he was created; and this, in regard to the duration of life, is of the utmost importance. Harmony in the movements is the grand foundation on which health, uniformity of restoration, and the duration of the body, depend; and these certainly cannot take place if we merely sit and think. The propensity to bodily movement is, in man, as great as the propensity to eating and drinking. Let us only look at a child. Sitting still is to it the greatest punishment. And the faculty of sitting the whole day, and not feeling the least desire for moving, is certainly an unnatural and diseased state. We are taught by experience, that those men attained to the greatest age, who accustomed themselves to strong and incessant exercise in the open air.

I consider it, therefore, as an indispensable law of longevity, that one should exercise, at least, an hour

every day, in the open air. The most healthful time is before meals, or from three to four hours after.

In this respect, besides small journeys, and excursions on horseback, moderate dancing, and other gymnastic exercises are of great service : and it is much to be wished that we here paid more attention to imitate the ancients, who managed scientifically this promoter of health, and suffered no external circumstances to prevent them from using it. It is of most benefit when not merely the body, but the soul also, is exercised and kept awake at the same time. A walk, therefore, to answer fully its object, must be directed to a quarter where the prospects are always agreeable, and to a certain term or spot.

## CHAPTER VIII.

The enjoyment of free air. Moderate temperature of warmth.

THE enjoyment of free air may be considered as a nourishment equally necessary for our existence as eating and drinking. Pure air is certainly the greatest means of strengthening and supporting life ; while confined and corrupted air is its most subtle and deadly poison.

From this may be deduced the following practical rules:—

1st. Suffer no day to pass without enjoying the pure open air beyond the boundaries of a town or city. Consider your walk not merely as the means of exercise, but, in a particular manner, as the enjoyment of the purest vital nourishment, which is indispensably necessary above all to those who are much confined to their apartments. Besides this advantage, one obtains that also of making one's self, by such daily enjoyment of air, acquainted and familiar with a free atmosphere ; and people are thus secured against one of the greatest evils that usually afflict mankind, I mean *too much sensibility in regard to all impressions and variations of the weather*. This is one of the most abundant sources of disease ; and there is no other method of counteracting it, but to harden one's self by daily exposure to the open air.

Lastly. By this custom one will obtain infinite advantage in regard to the eyes ; for it is certain that a great cause of weak eyes and short-sightedness are the four walls within which we are accustomed to live from our infancy, and by which the eyes at length lose their whole power of seeing remote objects distinctly. The best proof of this



is, that such weakness of the eyes is to be found only in cities, and not in the country.

2nd. One should endeavour, wherever it is possible, to live high. Those who have a regard for their health, at least in cities, ought not to inhabit the ground-floor. Let the windows be opened daily. Ventilators, or chimneys, are the best means for purifying the foul atmosphere of confined apartments. People ought not to sleep in rooms which have been inhabited the whole day; and the windows of bed-chambers should be always kept open in the day-time.

I must here add one remark of the utmost importance for the prolongation of life. The air in which one lives should be kept in a moderate degree of temperature. It is much better to live in air too cool than too hot; for heat accelerates, in an extraordinary degree, the stream of vital consumption, as is proved by the shorter lives of those who inhabit warm countries; and many people create artificially such a climate by means of their hot apartments. The temperature of the air in an apartment should never exceed 66° of Fahrenheit's thermometer.

## CHAPTER IX.

## Rural and country life.

FORTUNATE are they to whose lot it has fallen to remain near and true to their parent Earth; and to find their happiness, labour, and destination in immediate intercourse with Nature. They reside at the real source of eternal youth, health, and felicity; both body and soul enjoy there the utmost harmony and well-being. Simplicity, cheerfulness, innocence, and contentment, accompany them through life; and they attain to the utmost term which it is capable of reaching with its present organization. I cannot refrain, therefore, from inserting here what Herder has said on this subject:

The resolution of my friend to change  
 His walled prison for a rural seat  
 I much applaud—why should we foolishly  
 Pile up in lofty towers the hard hewn rock?  
 To fright us with their sudden fall, or hide  
 From our dark eyes the cheering face of heaven!  
 Not so in former days lived the young world,  
 In innocence and peace; free from such folly,  
 'Midst rural scenes—there harmless mirth prevails,  
 And fills the breast with never-ceasing joy:  
 There we behold the wide-expanded heaven;  
 No neighbour robs us of the light of day;  
 And from the clear fresh spring Apollo bids us  
 Assuage our thirst with his own liquor.  
 O did but men know what is happiness!  
 Our mother Nature ne'er within dark cities,  
 Or gloomy walls and castles, it confined.  
 It on the plain blooms equally for all.

Those find it oft who seek it not; and he  
Who spurns base ore will it enjoy—his treasure  
Is what the earth presents—in the bright stream  
He sees his silver; and his gold shoots up  
In yellow corn, or smiles from fruitful trees.  
He hears his concert in the shady grove;  
And there his chorus, free at will to range,  
Joins in the mirthful or the pensive strain.  
Far otherwise within the town confined:  
The captive songster in its cage complains!  
The slave who feeds it thinks it sings alone  
To please its master; but with every note  
It bids its tyrant give it liberty—  
Nature delights in rural scenes: and Art,  
Her imitator, there must follow her  
With timid steps. Of foliage ever green  
Behold yon palace, arched with thick woven boughs!  
Where thou mayst sit, like Persia's boasted lord  
In halls of cedar—and 'midst peace enjoy,  
What he ne'er knows, sound, sweet, refreshing sleep.  
Great cities are great plagues! There native joy  
Flies from man's breast, and makes him pleasure seek  
In Art alone—there every thing by paint  
Is seen disguised—the countenance and walls—  
Each action, word, and even the very heart—  
All there consists of costly wood or stone;  
And even the owners seem as hard as these.  
O rural life, 'midst poverty how rich!  
When hunger bids, there thou mayst nobly feast  
On what each season for thy use brings forth,  
In rich variety. The plough thy table;  
And a green leaf, by way of dish, supports  
Thy meal of fruit. A homely wooden jug  
Draws up refreshing drink from the pure stream,  
Which, free from poison, pours out health alone,  
And with soft murmur thee to sleep invites:  
While, in the air, the lark high-soaring sings—  
Now mounting up, again descending low—  
Until, at length, it drops into its nest,  
Just at thy foot, between two furrows placed.

If one, indeed, be desirous of sketching out, according to theoretical principles, the idea of a life conducive to health and longevity, one must recur to that presented to us by a country life. Nowhere are all the requisites for that purpose so perfectly united as here; and nowhere does everything in and around mankind labour so powerfully to promote health and longevity. The enjoyment of pure, sound air; simple and frugal food; daily and strong exercise without doors; established regularity in all the vital operations; the beautiful prospect of simple Nature; and a frame of internal peace, cheerfulness, and serenity, which by these means are diffused throughout the mind—what sources of vital restoration! Besides, a country life is, in a particular manner, capable of giving that disposition which is contrary to the passionate, overstrained, and eccentric; and the more so as it removes us from the dissipation, corruption, and worthlessness of the town, which tend always to nourish the passions. It consequently preserves, both internally and externally, peace of mind and equanimity, which are such great supports to life. It inspires us with cheerfulness and hope, and increases our enjoyments in general, but without violence or passion, and moderated by the softest tone of Nature. It needs excite no wonder, then, that, according to experience, instances of the greatest age are to be found in rural life only.

It is a melancholy reflection, that this kind of life, the earliest and most natural state of man, should at present be so little esteemed that the fortunate farmer even quits it till his son becomes a studious rake; and the proportion between countrymen and citizens seems daily to be diminished. It certainly would be much better for the happiness of individuals, as well as of the whole, if the greater part of the penknives and seissors now in use were converted into ploughshares, and that those hands occupied in scribbling were employed with the plough and the spade. The former, to many, is indeed only labour of the hands; but the latter is the most useful, and, if I am not much mistaken, we shall be at length obliged, from political con-

siderations, to recur to it once more. Man must again approach nearer to his parent Earth, from which he has so far removed in every point of view.

All, indeed, cannot be farmers by profession; but how beneficial would it be if men of letters, people of business, and those who labour with their heads, would divide their time between both kinds of employment; and imitate the ancients, who, notwithstanding their philosophical or political engagements, did not think it beneath their dignity to devote their spare hours to agriculture, and to rusticate in the proper sense of the word! All the melancholy consequences of a sedentary life, and overstraining the mental faculties, would disappear, if people, some hours every day, or a few months in the year, would take hold of a spade or a mattock and cultivate their field or their garden; for the usual method of living in the country, (which in general means nothing else than to carry along with one care and books, and to read, think, or write in the open air, instead of a chamber,) cannot accomplish that object. Such rustication will again restore the equilibrium between the mind and the body, which the writing-desk so often destroys. By an union of these three grand panaceas, exercise, free air, and exhilarating the spirits, a renovation and restoration may be annually effected, which will be of incredible service to vital duration and happiness. Nay I do not think I say too much when I promise, from this practice, besides physical advantages, many of a spiritual and moral nature also. Cobwebs of the brain and hypotheses of the closet will certainly be less abundant; people will not so often imagine the whole world to be contained in their persons, or within the four walls of their studies, and treat it in that point of view; and the mind will acquire a greater propensity to truth, more soundness, more warmth, and a more natural manner of thinking, properties which distinguish the Greek and Roman philosophers so much, and for which, in my opinion, they were indebted principally to their continual intercourse with Nature. One ought therefore to be exceed-



ingly careful never to suffer a *taste* for *Nature* to be extinguished in the mind. This taste may be easily destroyed, by always living reclusive, by incessant application to business, and by abstract speculations in the closet; and when it is once lost, the most beautiful rural scenes will have no effect upon us; and one, in the most delightful districts, and under the serenest sky, may remain in a state of living death. This may be best guarded against by not removing too long or too far from Nature; by quitting, as often as one can, the artificial and abstract world; by opening all the senses to the beneficent influences of Nature; and if one from the earliest youth endeavours to acquire a taste for the study of Natural History (a point which ought to be attended to in education), and to warm the imagination for it by the beautiful imitations of painting, and the heart-exalting descriptions of the poets of Nature, such as a Zaehariä, Thomson, Gesner, Matthison, &c.

## CHAPTER X.

## Travelling.

I CANNOT possibly omit to devote here a particular place to this enjoyment, and to recommend it as a means of prolonging life. The continual motion, variety of scene, exhilaration of the mind, and the use of free and changed air, have a magical effect upon mankind, and contribute in an incredible degree to renovate and revive the whole frame. Vital consumption may indeed be thereby somewhat increased; but this is amply counterbalanced by the increased restoration which is effected, partly in regard to the body, by digestion being strengthened and invigorated, and partly in regard to the mind, by a succession of agreeable impressions, and the forgetfulness of one's self. This help, therefore, I recommend to those whose employment condemns them to a sedentary life, who are continually engaged in abstract studies or oppressive labour, whose minds have sunk into a state of insensibility, melancholy or hypochondriasis, or, what is worst of all, are strangers to domestic felicity.

But as many employ it in such a manner that it produces no effect, it perhaps may be of some service to communicate here a few of the most important rules how people must travel in order to benefit their health and their life.

1st. Travelling on foot, or rather on horseback, is the most healthful, and best calculated to answer the end proposed; but when one is weakly, or undertakes long excursions, it is more advisable to travel in a carriage.

2nd. When one travels in a carriage, it is very beneficial always to change the posture; that is, to sit some-

times, and sometimes to recline. By these means one can best prevent the evils attending continued riding in this manner, which are occasioned principally by the jolting being in one direction.

3rd. Nature will not suffer any sudden transitions. It is therefore improper for people accustomed to a sedentary life to undertake suddenly a journey during which they will be exposed to violent jolting. The case here is the same as if one accustomed to drink water should all at once begin to drink wine. Let the transition be slow, and begin with moderate motion.

4th. Excursions, the object of which is health and the prolongation of life, must not be fatiguing; but this can be determined only by difference of temperament and constitution. Ten or twelve miles daily, with a rest every three or four days, may perhaps be the best standard. One ought, above all things, to avoid travelling in the night-time; which, by interrupting the necessary refreshment, checking perspiration, and exposing the body to unhealthful air, is always prejudicial. By respecting nocturnal rest, one may accomplish twice as much in the day.

5th. People must not imagine that they may indulge a little more in intemperance when on a journey. One, however, needs not to be too nice in the choice of food and drink; and it is always best to use the common fare of each country. But at any rate the stomach ought not to be overloaded. By the motion of travelling, the power of the body is too much divided for the stomach to admit of a large quantity of food; and the motion itself, by these means, will become more fatiguing. People, in particular, should not indulge too much in heating food and liquors, as is often the case on journeys; for travelling alone acts as a stimulus, and less stimulating nourishment is then required than in a state of rest. A want of attention to this rule may occasion too violent irritation, inflammation, accumulations of the blood, &c. It is most proper, on journeys, to eat rather little at a time, but

often; to drink more than one eats; and to choose food easy of digestion, yet strongly nutritive, not of a heating nature, and such as cannot be readily adulterated. It is safest, therefore, in the country, and in small inns, to use milk, eggs, well-baked bread, boiled or roasted meat, and fruit. I advise travellers, above all, to be on their guard against the wine kept in such houses. It will be much better to drink water, with the addition of a little lemon-juice, or of some good liquor which they may carry along with them. If the water be impure, it may be rendered sweet by charcoal powder.\*

6th. Avoid immoderate exertion and wasting of the powers. It is, however, as difficult in general to lay down a proper standard of motion, as of eating and drinking. But Nature, in this, has given us a very excellent guide, a sense of lassitude, which is here of as much importance as the sense of satiety in eating or drinking. Weariness is nothing else than the voice of Nature, which tells us that our stock of powers is exhausted, and that he who is tired should enjoy repose. But Nature may, indeed, become lost in habit; and we may be as insensible of lassitude as the continual glutton is of fulness, especially when the nerves are overstrained by stimulating and heating food and drink. There are then, however, other signs to tell us that we have exceeded the proper measure; and I request that to these the strictest attention may be paid. When one begins to be low-spirited or dejected; to yawn

\* This is one of the greatest and most beneficial discoveries of modern times, for which we are indebted to Mr. Lowiz of Petersburg. Water which has a disagreeable odour, or has become putrid, may almost immediately be freed from its nauseous taste, as well as its bad smell, and be converted into good drinkable liquor, by the following process:—Take some burnt charcoal, and reduce it to a fine powder. Mix about a tablespoonful of this powder in a pint of water, stir it well round, and suffer it to stand for a few minutes. Let it then run slowly through filtering paper into a glass, and it will be found quite transparent, without any bad taste or smell, and perfectly pure for drinking. People may preserve the charcoal powder a long time in a small bottle well corked, and carry it with them when they travel.

often, and be drowsy, yet at the same time to be incapable of sleeping though one enjoys rest; when the appetite is lost; when the smallest movement occasions a fluttering of the pulse, heat, and even trembling; when the mouth becomes dry, and is sensible of a bitter taste, it is high time to seek refreshment and repose, if one wishes to prevent illness already beginning to take place.

7th. While one is travelling, insensible perspiration may easily be checked; and cold is the principal source of those diseases which thence arise. It is advisable, therefore, to guard against all sudden transitions from heat to cold, or the contrary; and those who have great sensibility in the skin, will do well, when they go on a journey, to carry a thin flannel shirt along with them.

8th. Cleanliness, when one travels, is doubly necessary; and, therefore, to wash the body frequently with cold water is much to be recommended. This will contribute also, in a great degree, to remove lassitude.

9th. During winter, or in a cold climate, one may always submit to greater exercise than during summer, or in warm climates, where perspiration exhausts one half of the strength. One, also, can undergo more fatigue early in the morning than in the afternoon.

10th. Full-blooded persons, or those who are subject to a spitting of blood, or other serious disease, must consult their physician before they undertake a journey.



## CHAPTER XI.

Cleanliness, and care of the skin.

BOTH these I consider as important means for the prolongation of life. Cleanliness removes everything that Nature has secreted from us, as useless or corrupted; as well as everything prejudicial, that might be conveyed to us, from without, through the superficies of our bodies.

Care of the skin is an essential part of cleanliness, and consists in paying such attention to it from infancy, that it may be kept in a lively, active, and useful condition.

The skin, indeed, must not be considered merely as a common covering to defend us from the sun and the rain, but as one of the most important organs of our body, without the incessant activity and agency of which there can be neither health nor long life; and in the neglect of which, in modern times, lies the secret source of numberless diseases and evils that tend to shorten our existence. May the following observations, therefore, make more impression on my readers, and excite more attention to this organ and the management of it!

The skin is the greatest medium for purifying our bodies; and every moment a multitude of useless, corrupted, and worn-out particles evaporate through its numberless small vessels, in an insensible manner. This secretion is inseparably connected with life, and the circulation of our blood; and by it the greater part of all the impurity of our bodies is removed. If the skin, therefore, be flabby or inactive, and if its pores be stopped up, an acridity and corruption of our juices will be the unavoidable consequence, and the most dangerous diseases may ensue.

Besides, the skin is the seat of *feeling*, the most general of all our senses, or that which in an essential manner connects us with surrounding Nature, and in particular with the atmosphere; and by the state of which, in a great measure, the sensation of our own existence, and the relation which we bear to everything around us, is determined. Hence a greater or less sensibility, in regard to disease, depends very much on the skin; and those whose skin is weak or relaxed have generally a sensation too delicate and unnatural, by which means it happens that they are internally affected in a manner highly disagreeable, by every small variation in the weather, every change of the atmosphere, and at length become real barometers. Such a constitution is called the rheumatic, and arises chiefly from a want of strength in the skin. It occasions a tendency to perspiration, which is also an unnatural state, and which exposes us continually to colds and other disorders.

It is, likewise, a grand means for preserving an equilibrium in the powers and motion of our bodies. The more active and open the skin is, the more secure will people be against obstructions, and diseases of the lungs, intestines and lower stomach; and the less tendency will they have to *gastric* (bilious) *fevers*, *hypochondriasis*, *gout*, *asthma*, *catarrh* and *varicose veins*. One great cause of these disorders being at present so common amongst us, that we no longer endeavour to cleanse and strengthen the skin by bathing and other means.

The skin, moreover, is one of the most important means of restoration of our bodies, by which a multitude of fine spiritual component parts are conveyed to us from the atmosphere. Without a sound skin there can be no complete restoration, which is one of the chief principles of long life.

It ought also not to be forgotten, that the skin is the grand organ of crises, that is to say, the assistant of nature in disease; and that a man with open pores, and a skin sufficiently vigorous, may depend on being cured

much more easily and with more certainty, and often even without the use of medicine.

That such an organ must be a great support of health and life, no one will deny ; and it is therefore incomprehensible how people in modern times, since mankind have become more enlightened, should neglect it so much. Nay, we in general find, that, instead of paying the least attention to it, they from their infancy do everything in their power, as it were, to relax and to weaken it, and to stop up its pores. The most of mankind, except at baptism, never experience the benefit of bathing during their whole lives; the skin by dirt and daily perspiration is more and more stopped up ; weakened and relaxed by warm clothing, furs, feather-beds, &c. ; rendered inactive by confined air, and a sedentary life ; and I think I may, without exaggeration, assert, that, among the greater part of men, the pores of the skin are half-closed and unfit for use.

Let me here be permitted to call the attention of my readers to an incongruity, which is not the only one of the kind in human life. The most ignorant person is convinced that proper care of the skin is indispensably necessary for the existence and well-being of horses and various animals. The groom often denies himself sleep, and other gratifications, that he may curry and dress his horses sufficiently. If they become meagre and weak, the first reflection is, whether there may not have been some neglect or want of care in regard to combing them. Such a simple idea, however, never occurs to him in respect to his child. If it grow feeble and sickly ; if it pine away and is afflicted with disease, the consequence of dirt, he thinks rather of witchcraft and other absurdities than of the real cause, neglecting to keep the skin pure and clean. Since we show so much prudence and intelligence in regard to animals, why not in regard to men ?

The rules which I have to propose for preserving cleanliness and a sound state of the skin, are remarkably easy and simple ; and, if observed from youth, may be considered as very powerful means for the prolongation of life.

1st. Remove carefully everything that the body has secreted as corrupted or prejudicial. This may be done by changing the linen often, daily if it be possible, and also the bed-clothes, or at least the sheets; by using, instead of a feather-bed, a mattress, which attracts less dirt; and by continually renewing the air in apartments, and particularly in one's bedchamber.

2nd. Let the whole body be washed daily with cold water, and rub the skin strongly at the same time, by which means it will acquire a great deal of life and vigour.

3rd. One ought to bathe once a week, the whole year through, in tepid water; and it will be of considerable service to add to it three or four ounces of soap. It is much to be wished that public baths were again erected, that poor people might enjoy this benefit, and thereby be rendered strong and sound, as was the case some centuries ago.\*

I cannot quit this subject without mentioning sea-bathing, which, on account of its stimulative and penetrating power, may be placed at the head of those means that regard the care of the skin; and which certainly supplies one of the first wants of the present generation, by opening the pores, and thereby reinvigorating the whole

\* Traces of this laudable practice may still everywhere be seen in the remains of baths and bathing-houses; but the use of it has been abandoned through the inconceivable indolence of mankind. Every Sunday evening, people formerly went in procession through the streets, beating on basins, to remind the lower classes of bathing; and the tradesman, who laboured at dirty work, washed off, in the bath, that dirt which now adheres to him perhaps during his whole life. In every place of any consequence there should be a bathing-house, or a floating bath on some river for the summer, and another for the winter. In bathing it ought to be a rule never to enter the water with a full stomach, but either fasting or four hours after eating; never to bathe when the body is hot; to remain in cold water not more than a quarter of an hour, and in warm water never more than three quarters; to be cautious of catching cold when one comes out, which may be best done by putting on a flannel gown; and during dry warm weather, to take moderate exercise afterwards; but in cold, moist weather, to remain for an hour in a warm apartment.

nervous system. This bathing is attended with two important advantages. The first is, that besides its great healing power, in eases of disease, it may be employed by those who are perfectly well, as the means most agreeable to Nature for strengthening and preserving health; which is not the case with a great many other kinds of bathing, that are injurious to a healthy person. In this respect it may be compared to bodily exercise, which can remove diseases otherwise incurable—and which may be used also by those who are sound, in order to preserve themselves in that state. The other advantage is the noble, grand, and indescribable prospect of the sea connected with it; and which, on those not acquainted with it, has an effect capable of bracing up the nervous system, and producing a beneficial exaltation of the whole frame. I am fully convinced that the physical effects of sea-bathing must be greatly increased by this impression on the mind; and that a hypochondriac or nervous person may be half cured by residing on the sea-coast, and enjoying a view of the grand scenes of Nature which will there present themselves: such as the rising and setting of the sun over the blue expanse of the waters, the awful majesty of the waves during a storm, &c. For the like purpose, therefore, I would advise an inhabitant of the inland parts to take a journey to the sea; and an inhabitant of the coast to make an excursion to the Alps; for both, in my opinion, are the sublimest productions of Nature. The thanks of the public are undoubtedly due to that exalted prince, so much a friend to mankind, who erected the first sea-bath in Germany, at Dobruhn, near Rostock; and to that worthy physician Vogel, who formed the plan of it in a manner so excellent and so likely to make it answer the intended purpose, and who assists its salutary effects by his presence and advice.

4th. People should wear warm clothing that does not tend to weaken the skin, and which may readily suffer the perspiring matter to pass through it. In this respect, I know nothing more prejudicial than to wear fur, which, by



its great warmth, weakens the skin very much; does not promote evaporation, but sweat; and, on account of the thickness of the leather, does not suffer the perspiring particles to fly off. The consequence is, that a continual vapour-bath is formed between the fur and the skin, and that a great part of the impure matter is again thrown back on the body, and imbibed by it. Far better is flannel, which has the advantage of fur, without the disadvantage of attracting dirt and occasioning too much heat. But all these warm coverings on the bare skin are to be recommended only during intense cold or for weakly people subject to rheumatism. In infancy and youth, and for those whose bodies are sound, it is far preferable to wear next the skin either linen or cotton, with a vest of the same in summer, and in winter one of woollen.

5th. One should use much bodily exercise; for this is a great promoter of insensible perspiration.

6th. Avoid all food unfavourable to perspiration. Of this nature is fat of every kind, pork, goose, cheese, &c.

## CHAPTER XII.

Proper food. Moderation in eating and drinking. Preservation of the teeth.

THE idea of proper regimen is somewhat relative. In general, we find that those men who were not too nice or particular in regard to their food, but who lived sparingly, attained to the greatest age; and it is an advantage peculiar to man, that he can digest and assimilate the most heterogeneous kinds of nourishment, and is not, like other animals, confined to one certain class. It is proved that people in a natural state, who are much exposed to the free open air and to exercise, require few rules respecting their diet. It was our artificial manner of living that first rendered regimen necessary.

It is at any rate certain, that the prolongation of life does not so much depend on the quality, as on the quantity, of our nourishment; and the instance of Cornaro affords an astonishing proof how far a man of weakly constitution may thereby prolong his existence.

It may with truth be asserted, that the greater part of mankind eat more than is necessary; and by being crammed and over-fed in infancy, we are deprived of that natural sensation which ought to tell us when we have enough.

I shall here only give such common rules in regard to eating and drinking as will suit the generality of mankind; and which, I am convinced, will have an essential influence in prolonging life.

1st. It is not what we eat, but what we digest, that does us good, and serves to nourish our bodies. *He who wishes to live long ought, therefore, to eat slowly;* as our food must obtain in the mouth the first degree of prepara-

tion and assimilation. This is effected by its being sufficiently chewed and mixed with saliva; both which I consider as a principal part of the business of restoration, and consequently set great value upon them in regard to the prolongation of life, especially as it appears by my researches that all those who were accustomed to eat slowly attained to a great age.

2nd. A great deal depends on *good teeth*; and, therefore, I can with propriety reckon *preservation of the teeth* among those means that tend to prolong life. By the following rules, if observed from infancy, the teeth may be preserved fast and sound to the greatest age.

One must always join with the flesh used for food a sufficient quantity of vegetables and bread; for flesh adheres more readily between the teeth, and tends to injure them. It will be found, therefore, that those who use little or no flesh, boors and country people, have always the best teeth, though they never clean them. But no tooth-powder can be more efficacious than a piece of dry burnt bread; and it is a custom very salutary for the teeth, to chew slowly a crust of bread after every meal.

Avoid exposing the teeth to a sudden transition from heat to cold, or the contrary; for the teeth are covered with a glassy kind of enamel, which may be easily cracked by such sudden changes; so that corrupted particles can insinuate themselves into the rents, and lay the first foundation of decay within them. It will be best, therefore, never to take too hot or too cold things into the mouth; and be careful, above all, not to drink cold liquor while you are eating warm food, such as hot soup, &c.

Never eat sugar; and avoid confections, which are mixed with a great deal of tough calcareous particles.

As soon as you observe that a tooth is decayed, have it immediately pulled out, otherwise it will infect the rest.\*

\* It is an error to suppose that a decayed tooth has the power of infecting its neighbour, and it is bad advice to suggest its extraction. One of the chief agents of destruction of the teeth is pressure, therefore a tooth usually decays on the side which is contiguous to

Wash your teeth with water every morning, and in particular after each meal. This will remove any remains of food adhering to them, which commonly fix themselves between the teeth, and lay the first ground for decay.

Those who observe these rules will seldom have occasion for tooth-powder. But if the teeth have a tendency, as is the case naturally in some men, to become foul, or to acquire what is called tartar, I recommend the following harmless prescription:—Take half an ounce of red sandal-wood, with a quarter of an ounce of China-root (*smilax aspera Chinensis*); reduce them to a fine powder, and sift it through a hair-sieve.\* Then add to it six drops of the oil of cloves, and the same quantity of bergamot oil; and rub the teeth with it in the morning.

3rd. Beware of studying, reading, or straining the head while at table. That period must certainly be consecrated to the stomach. It is the time of its government; and the mind must no further interfere with it than may be necessary to assist its operations. Laughter is one of the greatest helps to digestion with which I am acquainted; and the custom, prevalent among our forefathers, of exciting it at table by jesters and buffoons, was founded on true medical principles. In a word, endeavour to have

another, and as in all probability both teeth are sufferers from the pressure, both are liable to decay: because one precedes the other in this action, it has been inferred that the decayed tooth has contaminated its fellow, but this is not the fact. Then as to the advice. When a tooth is decayed, the patient should seek the dentist, who will probably clear out the dead part, and stop the cavity with gold. When this operation is well and judiciously performed, the tooth will last as long as if it were perfectly sound. Hence, the chief art of the dentist of the present day is to save the teeth and not waste them, as was the case when our author flourished.—EDITOR.

\* This tooth-powder, composed of materials no longer in use, is very inferior to the tooth-powders of the present day; the best of which are those made either of simple *precipitated* chalk: of precipitated chalk with one-eighth part of orris-root; or of precipitated chalk with one-eighth part of camphor. Camphor has of late been accused of doing injury to the teeth, by rendering them brittle; whether such be really the case I am unable to decide.—EDITOR.

cheerful and merry companions at your meals. What nourishment one receives amidst mirth and jollity, will certainly produce good and light blood.

4th. Do not expose yourself to violent motion after meals; for this will disturb, in an astonishing degree, the digestion and assimilation of your nourishment. It will be best to stand, or to walk about slowly. The properest time for exercise is before meals, or three hours after.

5th. Never eat so much that you feel you have a stomach. It will be best to give over before you are completely sated. The quantity of food must be always proportioned to one's bodily labour: the less the labour, the less ought to be the nourishment.

6th. In the choice of food one should incline more to vegetables. Flesh has always a greater tendency to putrefaction; and vegetables, on the other hand, to acidity, which corrects putrefaction, our continual and greatest enemy. Besides, animal food is always of a more heating and stimulating nature; whereas vegetables produce cool, mild blood; lessen the internal motion, mental as well as bodily irritability; and powerfully retard vital consumption. Lastly, animal food yields more blood and nourishment; and requires, in order to be beneficial to us, much more labour and bodily motion; and, by the use of it, one also is liable to become plethoric. On this account it is not proper for men of letters, and those who sit a great deal; as such people do not require so strong restoration, or so much addition of substance, but only of those fine nourishing juices that are necessary for the spiritual functions. One, above all, ought to avoid flesh in summer, and when putrid fevers are prevalent. We find that it is not those who lived on flesh, but on vegetables, pulse, fruit, and milk, who attained to the greatest age; Lord Bacon mentions a man of 120, who, during his whole life, never used any other food than milk. The Brahmins, by their religion, are confined merely to vegetables, and, for the most part, live to the age of 100. John Wesley, in the middle of his life, gave over the use



of flesh; lived upon vegetables alone, and attained the age of 88.

7th. At night, one ought to eat sparingly, and use little or no flesh, if cold it will be best; and to sup a few hours before bed-time.

8th. Never neglect to use a sufficient quantity of drink. It too often happens that people, by inattention to the calls of Nature, forget drinking altogether, and are no longer reminded of it; which is the grand cause of aridity, obstructions in the lower stomach, and a multitude of diseases to be found so frequently among men of letters, and females, who lead a sedentary life. But it is to be observed, that the best time for drinking is not while one is eating, as the gastric juices are thereby rendered too thin, and the stomach weakened—but about an hour after meals.

The best drink is *water*, a liquor commonly despised, and even considered as prejudicial—I will not hesitate, however, to declare it to be one of the greatest means for prolonging life. Read what is said of it by that respectable veteran, Theden, surgeon-general, who ascribes his long life of more than 80 years chiefly to the daily use of seven or eight quarts (from twenty to twenty-four pounds) of fresh water, which he drank for upwards of forty years. Between his thirtieth and fortieth year he was a most miserable hypochondriac, oppressed with the deepest melancholy; tormented with a palpitation of the heart, indigestion, &c.; and imagined that he could not live six months. But from the time that he began this water-regimen, all these symptoms disappeared; and, in the latter half of his life, he enjoyed better health than before, and was perfectly free from the hypochondriac affection. One great point, however, is, that the water must be *fresh*, that is, recently drawn from a spring or running stream, and be put into a vessel well stopped; for all spring water, like the mineral, contains fixed air, which renders it strengthening and favourable to digestion. Pure, fresh water, has the following advantages, which certainly must inspire us with respect for it.

The element of water is the greatest and only promoter of digestion—by its coldness and fixed air it is an excellent strengthener and reviver of the stomach and nerves. On account of its abundance of fixed air, and the saline particles it contains, it is a powerful preventative of bile and putrefaction. It assists all the secretions of the body. Without water there could be no excretion; as, according to the latest experiments, oxygen is a component part of it, by drinking water we actually imbibe a new stimulus of life.

I cannot here omit to say something in favour of soups (liquid nourishment), since it has been lately fashionable to deery them as prejudicial.

The moderate use of soups is certainly not hurtful; and it is singular that people should imagine that it tends too much to relax the stomach. Does not all our drink, even though cold, become in a few minutes a kind of warm soup in the stomach; and does not the stomach retain the same temperature during the whole day? Be careful only not to use it hot, in too great quantity at one time, or too watery. It is attended even with great advantages. It supplies the place of drink, particularly to men of letters, women, and all those who do not drink, or drink very little except at table, and who, when they give over soup, receive into their blood too little moisture. And it is here to be remarked, that fluids used in the form of soup unite much better and sooner with our juices than when drunk cold and raw. On this account soup is a great preventative of dryness and rigidity in the body, and therefore the best nourishment for old people, and those who are of an arid temperament. It even supplies the place of medicine. After catching cold, in nervous headaches, colics, and different kinds of cramp in the stomach, warm soup is of excellent service. It may serve as a proof of the utility, or at least harmlessness, of soup, when I remark that our forefathers, who certainly had more strength than we have, used soup; that it is used by rustics, who are stronger than those in refined life; and that all the old

people with whom I ever was acquainted were great friends to it.

*Wine* rejoices the heart of man, but it is by no means necessary for long life, since those who never drank it seem to have become oldest. Nay, as a stimulant, which accelerates vital consumption, it may tend very much to shorten life, when used too frequently, or in too great abundance. To render it friendly and not prejudicial to life, it must be drunk daily, but always in moderation: the younger a man is in less, and the older in the greater quantity. It is best when one considers and uses wine as the seasoning of life, and reserves it for days of mirth and recreation to enliven the friendly circle.

## CHAPTER XIII.

Mental tranquillity. Contentment. Dispositions of mind,  
and employments which tend to prolong life.

PEACE of mind, cheerfulness, and contentment, are the foundation of all happiness, all health, and long life. Some may here say, these are means which we have not in our own power; they depend upon external circumstances. But to me it appears that the case is not so: for, otherwise, the great and rich would be the most contented and happy, and the poor the most miserable. Experience, however, shows the contrary; and more contentment, without doubt, is to be found amidst poverty, than among the class of the rich and wealthy.

There are sources then of contentment and happiness which lie in ourselves, and which we ought carefully to search out and to use. Let me here be permitted to mention a few of these helps, recommended by the simplest philosophy, and which I offer merely as rules of regimen, the good advice of a physician how to prolong life.

1st. Endeavour above all things to subdue your passions. A man who is continually subject to the impulse of his passions, is always in an extreme and exalted state, and can never attain that peaceful frame so necessary for the support of life. His internal vital consumption is thereby dreadfully increased, and he must soon be destroyed.

2nd. People should accustom themselves to consider life not as an object, but the means of attaining to higher perfection: and our existence and fate as always directed to a higher aim, and subjected to a more exalted power. They should never lose sight of that point of view which

the ancients named trust in providence. They will thus have the best clue to direct their way through the labyrinth of life, and the greatest security against all attacks by which their peace of mind might be disturbed.

3rd. Live always, but in the proper sense, for the day ; that is, employ every day as if it were your last, without taking any thought for to-morrow. Unhappy men who still think of what is to come, and, amidst your plans and projects for the future, lose the enjoyment of the present ! The present is the parent of the future ; and he who fully employs each day and each hour according to its destination, can in the evening lie down to repose with the agreeable satisfaction of having not only lived that day and fulfilled its object, but of having also laid the best foundation for the enjoyment of the future.

4th. Endeavour to form as just conceptions as possible of every event, and you will find that the greater part of the evils in the world arise from mistakes, false interest, or precipitation ; and that the principal point is not so much *what* is done to us, as *how* we take it. He who possesses this happy talent is independent of external circumstances. As *Weishaupt* has said, " It is certain that wisdom alone is the source of pleasure, and that folly is the source of misery. Without a total resignation in the will of providence, a conviction that all events are ordered for our good, and that contentment with the world which thence arises, everything is folly, and will lead to dissatisfaction."

5th. One should always strengthen and confirm more and more one's trust and confidence in mankind, and in all the noble virtues, benevolence, friendship, affection and humanity which thence arise. Consider every man as good, till you are convinced of the contrary by incontestable proofs ; and even then man ought to be looked upon as a being misled by error, who deserves our compassion much rather than our hatred. Man indeed would be good, were he not seduced by ignorance, misconception, and false interest. Woe to those whose philosophy



consists in trusting no one! Their life is a continual state of defensive and offensive war; and they must bid farewell to cheerfulness and contentment. The more a man entertains good wishes to all around him, the more will he render others happy, and the more happiness will he himself enjoy.

6th. To promote contentment and peace of mind, *Hope* is indispensably necessary. He who can hope prolongs his existence, not merely in idea, but physically, by the peace and equanimity which he thus secures.—I do not allude here to hope within the narrow boundaries of our present existence, but to hope beyond the grave! In my opinion, hope in immortality is the only hope that can make life of any value, and render the burdens of it easy and supportable.—Hope and Faith, ye great and divine virtues! who, without you, is able to wander through a life so full of error and deceit, whose beginning, as well as end, is involved in thick darkness; the duration of which is a moment, and in which we scarcely begin to look forwards to futurity when we are swallowed up by destruction. Ye are the only supports of the wavering; the greatest revivers of the weary traveller. Those who do not honour you as exalted virtues, must embrace you as indispensable assistants in this terrestrial life, and endeavour to be strong in you through a love for themselves, if not through a love for the things that are invisible.—In this respect one can say that religion itself may be a means for prolonging life. The more it subdues the passions, promotes self-denial, produces internal tranquillity, and enlivens the above consoling truths, the more will it serve to extend the period of mortal existence.

*Joy*, also, is one of the greatest panaceas of life. One must not, however, believe that it is always necessary to excite it by sought-for events and fortunate incidents. By that frame of mind which I have already delineated, people may be rendered susceptible of it; and those who have attained to that happy disposition will never want opportunities of rejoicing. But one should never neglect

to seek and employ every occasion of indulging in joy that is pure and not too violent. No joy is more healthful, or better calculated to prolong life, than that which is to be found in domestic happiness, in the company of cheerful and good men, and in contemplating with delight the beauties of Nature. A day spent in the country, under a serene sky, amidst a circle of agreeable friends, is certainly a more positive means of prolonging life than all the vital elixirs in the world.—*Laughter*, that external expression of joy, must not here be omitted. It is the most salutary of all the bodily movements; for it agitates both the body and the soul at the same time; promotes digestion, circulation, and respiration; and enlivens the vital power in every organ.

The higher pursuits and employment of the mind deserve here a place also; but I must remark, that it will be necessary to observe those prudential rules, which I have already laid down, to prevent an abuse of them. These higher enjoyments and pleasures are entirely peculiar to man, and an important source of vital restoration. Among these I reckon, above all, the reading of agreeable and instructive books; the study of interesting sciences; contemplating Nature, and examining her secrets; the discovering of new truths, by the combination of ideas, improving conversation, &c.

## CHAPTER XIV.

## Reality of character.

It is well known how extremely prejudicial to life is that occupation which renders it necessary for a man to exist some hours daily in an assumed state, not natural to him, I mean the employment of a player.

What then must the case be with those people who always carry on a like occupation, who are continually acting this or the other feigned part on the grand theatre of the world, and who never really are what they appear to be? Those indeed who are deceitful, live always under disguise, restraint, and a false character. They may be found, above all, among the over refined and too highly cultivated classes of mankind: but I am acquainted with no condition more unnatural.

It is bad enough to be obliged to wear clothes not made for us, which everywhere pinch and confine us, and which render every movement painful. But what is this to wearing a false character; to a moral restraint, where our words, conduct, gestures, and actions, are in continual opposition to our internal feelings and wishes; where we violently suppress our strongest natural propensities, and assume foreign ones; and where we are obliged to keep continually strained, every nerve and every vessel, in order to carry on that deception which is our whole existence? Such a false state is nothing else than a continual cramp; and this is proved by the consequences. An incessant restlessness and anxiety, deranged circulation and digestion, continued contradiction both physical and moral, are its unavoidable effects. In the end, it becomes impossible for these unfortunate men to lay aside this assumed cha-

raacter ; so that it becomes a second nature. They are at length lost, and cannot again find themselves. In a word, this false state keeps up continually a secret nervous fever. Internal irritation, and external cramp, are, both, parts of it ; and it must lead to destruction and the grave, the only place where such wretched beings can hope ever to lay aside the mask.

## CHAPTER XV.

Agreeable stimulants of the senses and of sensation  
moderately used.

THESE have a double effect in the prolongation of life. In the first place, by their immediate influence on the vital power, they enliven, strengthen, and exalt it; and, secondly, by increasing the activity of the whole machine, they put into much greater activity the organs of digestion, circulation, and secretion, which perform the most important functions of restoration. A certain cultivation and refinement of our sensibility is therefore healthful and necessary; because it renders us more susceptible of these enjoyments; only it must not be carried too far, else it may become a disease. In stimulating the senses also great care must be taken not to exceed the proper measure; for the same enjoyment which, when used in a moderate degree, is capable of restoring, may, if used too much, consume and exhaust.

All agreeable stimulants, which can affect us through the sight, hearing, smell, taste, and feeling, may be included under this head; and therefore the pleasures of music, painting, and the other imitative arts, poetry, &c., as they can exalt and renew these enjoyments. In the present view, however, it appears to me that *Music* deserves the preference, because no mental impression can have so speedy and immediate an effect in tuning, enlivening, and regulating the vital operations. Our whole frame assumes spontaneously the tone and character of the music; the pulse becomes either quicker, or more calm; the passions are roused, or softened, according to the will of this language of the soul, which, without words, merely through



the power of melody and harmony, acts immediately upon our most internal organs, and by these means enchants us often more irresistibly than eloquence itself. It is much to be wished that the study of music in this view were more common, and that it were more employed for such a noble purpose.

## CHAPTER XVI.

Preventing diseases. Judicious treatment of them. Proper use of medicine and physicians.

DISEASES, as has been already shown, belong, for the most part, to those causes which shorten life, and are even capable of breaking the vital thread abruptly. The business of medicine is to guard against these, as well as to cure them: and so far medicine may be considered and employed as a mean for prolonging life.

But error, here, is too common. Sometimes it is believed that this beneficial art can never be sufficiently employed, and that people can never take too many medicines. Sometimes it is so much abhorred, as something unnatural, that too few are used; and sometimes the falsest conceptions are formed of medicine, as well as of physicians; and both are employed in an improper manner. To this may be added, in modern times, a multitude of popular books, by which a great deal of crude, undigested information on medical subjects has been diffused among the public; and hence a greater misapplication of medicine has been occasioned, and the utmost injury to the health of mankind in general.

It is impossible for every one to be a physician. Physic is a science so extensive and difficult, that it requires close and long-continued study, and even a peculiar formation of mind and of the higher powers of the soul. An acquaintance with the rules and means for curing diseases does not form a physician, as some imagine. These rules and means are the result of medical experience; and he only who can perceive the connexion of them with the causes of disease, and the whole chain of grounds and inferences from which they are deduced, in a word, who

can himself discover these means, deserves to be called a physician. From this it appears that the art of medicine never can be known by the generality of the public.

That branch of the medical art only which teaches an acquaintance with the human body, so far as it may be useful for every man to know, and the method and manner of guarding against diseases and preserving health, both individually and generally, can, or ought to, form a part of that instruction and information which should be communicated to the public. This is evident from the simple idea of disease, and the helps to be applied. What is meant by administering medicines and curing diseases? Nothing else than by an unusual impression to produce an unusual change in the human body, by which an unnatural state named disease may be removed. Disease and the operation of medicines are each an unnatural state; and the application of medicine is nothing else than exciting an artificial disease, in order to expel one that is natural. This may be seen when a man in good health takes physic, which will always render him ill in a greater or less degree. The use of medicine is, therefore, of itself prejudicial; and can be excused and rendered healthful only when a more diseased state of the body is thereby removed. This right of making one's self or others sick artificially, ought never to be exercised but by those who are sufficiently able to discover what proportion the disease may bear to the means; consequently, by physicians; otherwise it may happen that, when the means perhaps are altogether unnecessary, one may be rendered ill; or that the means will not be suited to the disease, and therefore the poor patient must suffer under two maladies instead of having one; or that the means may promote and increase the diseased state already existing. In cases of disease it will be far better to use no medicine at all, than to employ that which is not proper.

As none, therefore, but people regularly bred, ought to be allowed to practise medicine, this important question

arises : *How must medicine be used when we wish to employ it as the means of prolonging life?* In order to answer the above question, I shall here give some general rules and definitions.

But, first, let me be permitted to say a few words on a part of this research, which, though most interesting to the physician, is of too much importance even to others to be passed over in silence. I mean, *How does the practice of physic, in general, contribute to the prolongation of life?* Can one consider it absolutely as a means for prolonging our existence? Without doubt we can, so far as it cures disorders that might destroy us—but not always in other respects : and I shall here add, for the consideration of my medical brethren, a few observations which may show that to restore health and prolong life are not the same ; and that the point is not merely to cure a disease, but *how* it is cured. *First*, it is certain, from what has been said, that medicine operates by occasioning an artificial illness. Every disease is attended with irritation and a loss of power. If the medicine, therefore, be more powerful than the disease, the patient will be cured ; but he will be more weakened by the process of the cure, and more will be deducted from the duration of his life than would have been taken from it by the disease. This is the case when people, on trifling occasions, employ immediately the most powerful and the most violent medicines. *Secondly*, a disease may be cured by various ways and methods. The difference is, that one leads the crisis sometimes to one part, and sometimes to another ; or that the disorder is removed sooner by one method, and more slowly by another. These different modes of cure may all, however, lead to a restoration of health, but be of very different effect in regard to the prolongation of life. The more a cure allows the disease to continue, and to weaken the powers and the organs ; or the more it affects the organs necessary for life, or conducts the disease thither, and consequently impedes afterwards vital restoration (as for example, when the important system of digestion is made

the seat of the disease, and weakened by powerful remedies); or lastly, the more a cure wastes unnecessarily the vital power in general, as by too profusely bleeding, withdrawing the usual nourishment too incessantly, &c., the more will it weaken the grounds of longevity, even though it may remove the disease. *Thirdly*, one must never forget that disease itself may be useful and necessary for prolonging life. There are many diseases which are nothing else than an exertion of Nature to restore the equilibrium that has been destroyed, to evacuate corrupted matter, or to dissipate obstructions. If a physician, therefore (according to the true *Brownian* method), does nothing more than check the disease from showing itself outwardly, without paying attention to remote causes and consequences, he only destroys the active counteraction of Nature, by which it endeavours to remove the real disease: he quenches the fire outwardly, but suffers it to burn more violently within. He nourishes the germ, the material cause of the evil, which perhaps would have been banished by this process of Nature had it been suffered to be completed, and renders it stronger and more incurable. We have too many instances of patients who believed themselves perfectly cured of a fever or the dysentery, and who afterwards became hectic, or fell into the hypochondriasis, nervous weakness, and the like. No one will deny that such a cure, though it seems for the present to restore the patient to health, may nevertheless shorten the duration of his life.

I shall now proceed to answer a question which concerns those only who are not physicians: *By what means can diseases be prevented; how ought those which have already appeared to be treated; and, in particular, how ought physicians and the medical art to be employed in order to contribute in the highest degree possible to the support and prolongation of life?*

But let me first speak of the means to be used for preventing diseases. As there are two things which belong to the origin of every disease, the cause that



excites it, and the capacity of the body for being affected by this cause, there are two ways by which disease may be prevented, either to remove that cause, or to destroy the sensibility of the body in regard to it; and upon this is founded the whole medical dictetic, and all the preventative methods. The first method, which has been most commonly pursued, is the most uncertain; for, as long as we are not able to alter our mode of living, it will be impossible to guard against every cause of disease; and the more we deviate from it, the more we shall be affected by them when they attack us. For instance, cold never hurts any one so much as those who, in general, keep themselves exceedingly warm. Far better is the second method, to endeavour to guard against those causes of disease which can be avoided; and to accustom one's self to the rest, in order that the body may be rendered insensible to them.

The principal causes of disease, which can, in a great measure, be guarded against, are, intemperance in eating and drinking, immoderate enjoyment of physical love, great heat and cold, or a sudden transition from the one to the other; passions, violent exertion of the mind, too much or too little sleep, checked evacuations, and poisons.

One ought, however, to render the body less susceptible of these causes, or to harden it pathologically; and for that purpose I recommend the following means: First, the daily enjoyment of free air. In good or bad weather, during rain, wind or snow, the excellent practice of walking or riding for a few hours in the open air, must be continued every day *without exception*. This will contribute in an incredible degree to harden the constitution, and to promote longevity; and, when done daily, the body will soon become so strong as to be affected by no kind of weather. It is to be recommended, therefore, in particular, to those who are subject to the gout and the rheumatism.—Secondly, to wash daily the whole body with cold water; not to keep one's self too warm; and to pre-

serve the activity of the body. Never let the body sink into too passive a state, but endeavour, by muscular motion, friction, and gymnastic exercises. to keep up in it a kind of counteraction. The more passive the body is, the more susceptible will it be of disease. Lastly, a certain freedom and immunity from restraint in your way of life; that is to say, do not bind yourself too rigidly to certain rules and habits, but allow yourself a moderate indulgence. Those who confine themselves with too much severity to order and regimen, be they ever so good, make themselves thereby more susceptible of disease; for if they deviate in the least from what is now become to them a second nature, some kind of indisposition will be the consequence. A little irregularity, by the gentle revolutions which it effects in the body, may be of great use in purifying, opening and dissipating; and even pernicious things lose a great deal of their noxious quality when one is accustomed to them. A little less sleep than usual; to drink sometimes a glass more than common; to eat a little more food, or substances harder of digestion; to expose oneself to cold or heat by riding, dancing, and the like; to take exercise till one is tired, and sometimes to fast a day, are all means, therefore, that contribute to harden the body, and which give more latitude to the health, as they free it from too slavish a dependence on the uniformity of habit, to which it is not always possible for us to be confined.

A grand point in guarding against disease is, that every one should try to discover to what malady he is constitutionally most disposed, in order that this tendency may be destroyed, or at least that all opportunity of its being converted into disease may be removed. On this is grounded individual regimen; and every man ought to observe that which is proper for him, so far as to counteract his particular morbid disposition. To inquire into and determine this point is indeed the business principally of the medical practitioner; and I am therefore of opinion, that people, on a subject of so much

moment, should consult an intelligent physician, and allow him to judge what diseases they have the greatest disposition to, and what regimen may be best suited for them. In this respect the ancients were more prudent than we. They employed the medical art and physicians chiefly for determining their dietetic mode of life; and even their astrological, chiromantic, and other researches of the like kind, tended, at bottom, to define the moral and physical character of man, and to prescribe for him accordingly a proper mode of living and regimen. They undoubtedly did much better in thus employing their physicians than if they had run to them every week to make them prescribe for them purgatives or emetics. But for this purpose a judicious, prudent, and acute physician is necessary; while, on the other hand, any empiric is capable of writing a prescription. These people, at any rate, had a surer means of distinguishing a false from a true prophet.

That those unacquainted with the medical art may be enabled, as much as possible, to determine the nature of their constitution, and what tendency it has to disease, I shall here give the following rules:—

1st. Examine what disposition to disease you inherit from your parents. There are certain morbid tendencies which may be communicated by generation, such as to the gout, indigestion, nervous weakness, and consumption. If these evils have taken root in the parents, there is great reason to suspect a disposition to them in the children. By a proper regimen they can, however, be prevented from attaining to a great height.

2nd. A disposition to some disorders may be created by the first treatment in infancy; especially if a child be kept too warm, which excites a tendency to perspiration, renders the skin flaccid, and, by these means, disposes the body to rheumatic disorders. Too early application to learning, gives a tendency to nervous weakness, and diseases of the nerves.

3rd. A tendency to certain diseases is connected with

some forms and kinds of bodily structure. Those who are tall and thin, who have a long slender neck, a flat breast, projecting shoulders, and who have grown up suddenly to a great height, must be on their guard chiefly against consumptions, and in particular as long as they are under the age of thirty. Those who have a short thickset body, a large thick head, with a short neck, so that the head seems to be stuck between the shoulders, show a disposition to apoplexy; and must beware of everything that may give occasion to that disease. In general, all overgrown people have a tendency more or less to consumption and disorders of the breast.

4th. Every man ought carefully to examine his temperament. If it be sanguine or choleric, it gives a tendency to inflammation; but if phlegmatic or melancholic, to chronic diseases and weakness of the nerves.

5th. The climate also, and the spot in which one lives, may create a tendency to disease. If they are cold and damp, one may rest assured that they will produce a disposition to nervous and bilious fevers, ague, gout, and rheumatism.

6th. To pay attention, in particular, to one's weakest part is of importance. Every man, in a physical sense, has his weak side; and all causes of disease are accustomed, in general, to fix themselves in those parts which are by nature weakest. Those, for example, who have weak lungs, will be affected chiefly in that part; and everything almost will give rise to a catarrh or disorder of the chest. If the stomach be weak, it will be acted upon by every slight cause; and indigestion, crudity and foulness of it will be the consequence. If one is acquainted with these parts, one may contribute very much to the prevention of disease, and the prolongation of life; partly by guarding them against morbid causes, and partly by strengthening them, and depriving them of their too great sensibility. As much depends, therefore, on acquiring the art how to discover the weakest parts of one's body, I shall give the following signs, which may be understood



by those even who are not physicians :—Observe on what parts any mental shock, or violent affection, produces the greatest effect; for these are the weakest. If these causes immediately excite a cough or uneasy sensation in the chest, the lungs are the part pointed out; if they occasion a compression of the stomach, flatulency, and the like, one may be assured that the weak part is the stomach. Observe also where the effects of other morbid influences are reflected; as, for example, the effects of a surfeit, a cold, overheating, violent exercise, &c. If the chest be attacked, that may be considered as the weakest part. It is of equal importance to observe which way the blood and juices have the greatest tendency; what parts are usually the reddest and the hottest, and where perspiration appears in the greatest abundance; for, there, if the rest of the body do not perspire, will disease most readily fix itself. One may also, in general, conclude that any part which one uses violently and immoderately, or which one overstrains, will become weaker: for example, the brain among studious people; the chest among singers; the stomach among gluttons, &c.

I shall now proceed to answer the question, *In what manner should a disease which has already taken place be treated, and what use ought to be made of physicians and of the medical art?* The most important part of the answer may be reduced to the following rules:—

1st. Never use medicine without a sufficient cause; for, who wish to make themselves sick unnecessarily? The custom, therefore, of purging, bleeding, and the like, at stated periods, merely for the purpose of guarding against a possible evil, is highly prejudicial. This practice often gives rise to those disorders which one endeavours to avoid.

2nd. It is much better to prevent diseases than to cure them; for the latter is always connected with a greater loss of the powers, and consequently of vital duration. Let the above means, therefore, for guarding against them be carefully observed.



3rd. As soon, however, as disease makes its appearance, the greatest attention ought to be paid to it; for the most trifling indisposition may conceal under it a very serious malady. This is the case, in particular, with feverish disorders. The commencement of them is shown by the following symptoms:—One experiences an uncommon lassitude; the appetite fails, and one has a much greater desire for drinking; the sleep is interrupted or disturbed by dreams; the usual excretions are checked, or increased in an unnatural manner; one has no inclination for labour, and is affected by headache, and a greater or less degree of coldness, which is followed by heat.

4th. As soon as one perceives these symptoms, nothing is so necessary as to lessen one's nourishment, which strengthens the disease, and to follow the beneficent instinct of Nature, which every animal, to its great advantage, obeys on such occasions. Let the patient abstain from eating; for Nature, by rejecting food, shows that she is incapable of digesting it; and let him drink a little more than usual, but only water, or some other light beverage. One ought also to be kept quiet; to lie in the best position, for the lassitude sufficiently shows that Nature requires her strength for modifying the disease; and one ought to avoid both heat and cold, consequently should neither go out into the open air, nor be shut up in a warm apartment. These simple means, prescribed to us so clearly by Nature herself, are capable, would we only listen to her voice, of checking an infinite number of diseases in their very birth. Old Macklin, that veteran of the London stage, who died in his 99th year, used to say, that, when he found himself ill, during the long course of his life, he always went to bed—took nothing but bread and water—and that by this regimen he was generally relieved from every slight indisposition. I knew a respectable magistrate of fourscore, who, when indisposed, did nothing else than fast, smoke tobacco, and observe the above rules; by which means he had never occasion for medicine.

5th. If one has an opportunity of conversing with a physician, he ought to be consulted, not so much respecting prescriptions, as the state of one's body. Should such an opportunity be wanting, it is much better to prevent by the negative method an increase of the disease, than to employ anything positive, which may perhaps do hurt. No medicine, indeed, ought to be considered as a matter of indifference. Purgatives even, if used at an improper time, may be highly prejudicial. If my readers be desirous of knowing the most harmless, it is a teaspoonful of cream of tartar, stirred round in a glass of water; or the following draught, which certainly is one of the most general remedies for feverish disorders:—Take half an ounce of cream of tartar, and boil it with six pounds of water, in a new earthen pot, until the powder is wholly dissolved. After it is taken from the fire, add to it an orange cut into slices, with from an ounce and a half to three ounces of sugar, according to taste, and then put it into bottles for use. This may serve as one's common beverage.

6th. Be ingenuous with your physician, and give him a true account of your past life, so far as it may relate to the disease; and forget no unfavourable circumstance, especially when the case is stated in writing. Avoid, in particular, all reasoning on it, which is a common fault, or of giving any representation according to a preconceived opinion, but relate merely what you have observed in as unprejudiced a manner as possible.

7th. Make choice of a physician in whom you can place confidence, but none of those who deal in arcana, who are too talkative or inquisitive, who value themselves above others, or who endeavour to make the conduct of others appear in a dubious light; for this always betrays ignorance, a bad head, or a bad heart; in short, none of those who are fond of prescribing strong powerful medicines, or who, according to the common saying, will either cure or kill.

8th. Avoid in particular a physician whose principal

object in his practice is avarice or ambition. A real physician ought to have no objects but the health and preservation of his patients; any others mislead him from the true path, and may be attended with the most prejudicial consequences to those who employ him. If he happen to be so situated with a ease that either his reputation or his pocket will suffer if he venture anything for the relief of his patient, he will certainly rather allow the patient to die than lose his reputation. He will also be interested in the fate of his patients, in proportion to their rank and their riches.

9th. The best physician is he who is at the same time a friend. One may be open-hearted with such a man, and place confidence in him. He is acquainted with his patients, and observes them when in a state of health, which is of the utmost importance to enable him to treat them in a proper manner when attacked by disease. In short, he is strongly interested in their condition, and will exert himself with more activity and attention to restore their health, than the physician who acts merely in that capacity. People, therefore, ought to do everything in their power to unite themselves in the tenderest bonds of friendship with their physician; and never to dissolve their intimacy by want of confidence, peevishness, pride, or any other impropriety of behaviour, which is so often shown towards physicians, but always with more injury to the patient.

10th. Be greatly on your guard against any physician who prepares and employs secret medicines; for he is either an interested man, who values his own advantage far above the lives and health of his patients, or an ignorant impostor; and no impostor is more destructive than he who deprives you, not only of your money, but also of your health. If a secret be of any value, and useful to mankind, it should be the property of the public, and ought to be made known for the general benefit; and he who discloses it is entitled without doubt to immortal honour. Those also who conceal such remedies do injury

to thousands; because people cannot use them properly, not being well enough acquainted with them; or because they cannot be procured in common, and be employed by a judicious physician.

11th. Nowhere, in general, ought one to be more attentive to morality of character than in the choice of a physician; for where is it more necessary? If he to whom you blindly intrust your life, who is subject to no tribunal but that of his conscience, and who, to discharge in a complete manner the duty of his calling, must sacrifice all rest and pleasure, nay his own health and life, if this man do not act according to the pure principles of morality, but makes policy, as it is called, his motive, he is a detestable and dangerous character, and ought to be avoided with greater care than the most destructive disease. A physician without morals is not a nonentity—he is a monster.

12th. If people, however, meet with an able and honest physician, they ought to intrust themselves to him with full confidence. This will tend to make the minds of the patients quiet, and be of great service to assist the physician in effecting a cure. Many believe, that the more physicians they collect around them, the more certain they must be of relief; but this is a gross error. I here speak from experience. One physician is better than two—two than three—and so on in proportion. In the same ratio as physicians are increased will the probability of cure decrease; and in my opinion, there is a certain point of medical overloading, in which a cure is physically impossible. Some cases, indeed, may occur, but very seldom, in which a disorder, by being secret or complex, may require a consultation of several. One, however, ought to call in only those who are known to be judicious men, and who will act in concert; and to employ such consultations for discovering and defining the disease, and to form a plan of the method to be followed in the cure. The application of it should always be permitted to one, and to that practitioner in whom people have the greatest confidence.

13th. One ought carefully to observe the crises, or helps and means of which Nature seems to be fondest, and which she perhaps may have employed on former occasions, and whether she is accustomed to assist herself by perspiration, diarrhœa, bleeding at the nose, or otherwise. The same means one must endeavour to promote in every disease of the like kind; and such information is of great importance to the physician.

14th. To pay attention to cleanliness is a precept indispensably necessary to be observed in regard to every disease; for, by means of dirt, any disorder may be converted into one putrid, and far more dangerous. By neglecting this point, therefore, people injure not only their friends and relations, but also the physician, who may thus be deprived of his own health. The patient's linen, on this account, ought to be changed daily, but at the same time with some caution; the air ought to be renewed in his apartment, and all offensive matters should be speedily conveyed from it. As few people as possible should be suffered to continue in it; and all animals, flowers, remains of food, old clothes, and in short everything that may produce evaporation, ought to be removed from it.



## CHAPTER XVII.

Relief in cases where one is exposed to the danger  
of sudden death.

THERE are certain causes which, where the health is perfectly sound, and where one has the best capacity for long life, may suddenly interrupt and destroy the vital operation. I here allude to the violent causes of sudden death; and as to lessen these, or to render them harmless, is an important part of the art of preserving and prolonging life, I shall lay before my readers what information may be necessary on the subject.

To this head belong all violent kinds of death, which may be effected either by mechanical injuries, or organic derangement; and they may all be reduced to three classes. They either render the vital organs unfit for performing their functions; destroy suddenly the vital power, as lightning, violent passion, and the greater part of poisons; or they suddenly destroy vital irritability, without the continual agency of which there could be no vital exertion.

The method of counteracting these is twofold. One can either guard against them, or destroy their effect after they have already begun to act.

I shall first speak of the means by which one can guard against them. It is impossible to keep at a distance all these causes; for they are so connected with our life, and in particular with the employment of many, that one must resign life itself in order to avoid them. We can however, procure to our bodies a great degree of immunity from them, and give it some properties by which it will be put in such a condition as to sustain little or

no hurt from them when they approach it. There is, therefore, an objective and a subjective art of guarding against the dangers of death; and the latter is that in which every one should endeavour to acquire a certain degree of perfection. In my opinion, it is necessary for the formation and education of man. The means are exceedingly simple.

1st. Endeavour to give to the body the utmost possible agility and readiness in all bodily exercises. A sufficient cultivation of the corporeal powers, by running, climbing, tumbling, swimming, walking on any narrow ridge, &c. will be a great means of securing one from dangerous accidents; and were such a part of education more common, fewer people would lose their lives by drowning, falls, and other misfortunes of the like kind.

2nd. The judgment should be formed, and one's knowledge rectified, by the study of Natural Philosophy, and Natural History, in regard to every pernicious power. To this belongs an acquaintance with the nature of poisons; the properties of lightning, and the means of avoiding it; the noxious quality and effects of mephitic air, frost, &c. To give sufficient cautions on this subject, it would be necessary for me to write a whole treatise; and I sincerely wish that some one would undertake such a work, and that it may be introduced into schools.

3rd. Endeavour to render the mind intrepid; to give it strength and philosophical equanimity; and accustom it to sudden and unexpected events. This will be doubly beneficial. One will thereby guard against the physical injury of sudden and alarming impressions, and will have more presence of mind to pursue the means proper to be used in cases of sudden danger.

4th. Give to the body a sufficient degree of hardening against cold and heat, or any changes of the like kind. Those who possess this property will be able to brave death on many occasions, when others will be obliged to submit to it.

But, in regard to the danger of death actually existing:

What is to be done in cases of drowning, hanging, suffocation, poisoning, or being struck with lightning, &c.? Even here there are means by which persons apparently dead have been happily brought again to life; and this is a part of medicine which every man should understand, for such accidents may occur to every one, and everything depends on assistance being given speedily. In cases of so much danger each moment is precious; and the simplest means employed immediately, may effect more than the whole wisdom of an Æsculapius could half an hour later. He who first arrives when an accident has taken place should consider it as his duty to apply help instantaneously, and carefully reflect that the life of an unfortunate being may depend on a minute sooner or later.

The violent kinds of death, in regard to their treatment, may be divided into three classes.

The *first class* comprehends suffocation by hanging, drowning, or foul air, and death, or the being struck by lightning, with the mode of treatment. The first and most effectual means in such cases are the following:—

1st. Be as expeditious as you can to draw the body from the water, or to cut the rope, in a word, to remove the cause of death. This alone is sufficient to save the unfortunate person if it be done speedily; but attention to that point is too much neglected. In most places apparatus is kept for giving relief in such cases; but people in general are so slow in applying it, that one might believe it intended rather for the funeral ceremony, than for saving the life of a fellow-creature. I am, therefore, fully convinced, that better machinery for dragging up the bodies of drowned persons would be far more valuable than all the apparatus for restoring suspended animation; and when one sees how unwillingly and in how awkward a manner people undertake this business, how averse they are to it, and what prejudice prevails against it, one will not wonder that so few unfortunate persons should be saved in Germany. I must therefore entreat all governments

to endeavour to bring this part of the establishment for restoring life to greater perfection; and here I include rooting out prejudice,\* disputes respecting jurisdiction, the payment of the reward, and the punishment of voluntary delay.

2nd. The body should be immediately stripped, and every endeavour should be made, as speedily as possible, to excite in it a general warmth. Heat is the first and most general stimulus of life. The same means which Nature employs to quicken life in the beginning, are also the most powerful to produce life a second time. The best thing for that purpose is the tepid bath; but if this cannot be had, the patient may be covered with warm sand, ashes, or thick blankets in a bed; and hot stones should be applied to various parts of the body. Without these means all others will be of little avail; and it is much better to warm thoroughly persons apparently dead, than to use cupping, friction, or the like, and at the same time to suffer them to become stiff with cold.

3rd. To convey air into the lungs is the next process in point of importance, and may be connected with the excitation of heat. It is, indeed, most beneficial when it is done with oxygen gas by means of a pipe and a pair of bellows. But in urgent cases, and to save precious time, it will be sufficient if one presses on the chest so as to expel the air which it contains, and then, by withdrawing the pressure allows it to expand by its own elasticity, and thus fill the lungs with air. This should be done with regularity, so as to imitate ordinary breathing.

4th. Let fall now and then, from a certain height, drops of frigid water or wine on the pit of the stomach. This sometimes has given the first stimulus to restore the motion of the heart.

\* Of this kind is the shameful dread of the dishonour and disgrace which attend the touching of such unfortunate people; the diabolical superstition of many fishermen, that one must not draw the body of a drowned person from the water before sunset, in order that the fish may not be frightened away; or that some rivers must have an annual offering; and other ideas of the like kind, which prevail among the vulgar much more than one might imagine.



5th. Rub with a cloth or flesh-brush the hands and soles of the feet, the belly and the back : irritate the sensible parts of the body, such as the soles of the feet and hollow of the hands, by friction with stimulating oils ; the nose and throat, by means of a feather, or by holding to the nostrils, and dropping on the tongue, volatile spirit of ammonia, &c.

6th. As soon as signs of life begin to appear, pour a spoonful of good wine into the mouth ; and when the patient swallows it, repeat the same thing often. In cases of necessity brandy may be used, but mixed with two-thirds of water.

7th. For those who have been struck by lightning, the earth bath is to be recommended. The body may be either laid, with the mouth open, against a spot of earth newly dug up, or fresh earth may be scraped round it up to the neck.

If these simple means, which every one can and ought to use in regard to his fellow-citizens, when exposed to the danger of sudden death, be speedily employed, they will be of more service than the most complete apparatus applied half an hour later ; and at any rate the intermediate time will not be entirely lost, and the feeble vital spark may be prevented from being totally extinguished.

In the *second class* is comprehended those who have been *frozen*. These require a mode of treatment entirely different ; for by warmth they would be destroyed altogether. Nothing further is to be done than to immerse them in snow up to the head ; or to place them in a bath of the coldest water that can be procured without being frozen. Here life will return of itself ; and as soon as any signs of it appear, give the patients a little warm tea with wine, and put them to bed.

The *third class* contains those who have been poisoned. It is here to be observed, that we are in possession of two invaluable remedies, proper for any poison, which may be everywhere found, and which require no previous acquaintance with medicine—I mean *milk* and *oil*. By the help of



these only, the most dreadful of all the kinds of poisoning, that by *arsenic*, has been cured. Both of them answer the principal object, which is to expel the poison, or to destroy its power. Let persons, therefore, who have been poisoned, drink as much milk as they can (if it in part comes up again, so much the better); and let them, every quarter of an hour, take a cupful of oil of any sort; for it is all the same whether it be oil of linseed, almonds, poppies, or common oil. If it be known with certainty that the poison is arsenic, corrosive sublimate, or any other metallic salt, dissolve soap in water, and let the patient swallow it. This will be sufficient till a physician arrive, and will often render his assistance unnecessary.

## CHAPTER XVIII.

Old age. Proper treatment of it.

OLD age, though the natural consequence of living, and the commencement of death, can itself, on the other hand, be a means for prolonging our existence. It does not, however, increase the power to live, but it retards its being exhausted; and one may thus affirm, that a man in the last period of life, at the time when his powers are lessened, would, were he not old, finish his career sooner.

This position, which appears to be somewhat paradoxical, is confirmed by the following explanation:—Man, during the period of old age, has a much smaller provision of vital power, and much less capacity for restoration. If he lived with the same activity and vigour as before, this provision would be much sooner exhausted, and death would soon be the consequence. Now the character of age lessens the natural irritability and sensibility of the body, by which the effects of internal as well as external irritation, and consequently the exertion and wasting of the powers, are also lessened; and, on this account, as consumption is less, he can with such a stock of powers hold out much longer. The decrease of the intensity of the vital processes, as age increases, prolongs therefore vital duration.

Irritability being thus lessened, lessens also the effect of pernicious impressions and morbid causes, such as the passions, overheating, &c.; it preserves likewise much greater quietness and uniformity in the internal economy, and in that manner secures the body from many diseases. It is observed that, for this reason also, old people are much less attacked by infectious disorders than those who are young.

To this may be added the habit of living, which, without doubt, in the latter period of one's days, contributes to the support of life. An animal operation, which one has carried on so long, always in the same order and succession, becomes at last so eustomary that it continues through habit when the action of other causes ceases. It is often astonishing how the greatest debility of age will hold out, provided everything remain in its usual order and succession. The spiritual man is sometimes actually dead; and yet the vegetative, the man-plant, still continues to live; but for the latter, indeed, much less is necessary. To this habit of life it is owing also that a man, the older he grows, becomes still fonder of existence.

If old age, therefore, be properly treated and supported, it can be employed, in some measure, as a means of prolonging life; but, as this requires deviations from the general laws, I consider it necessary to give the rules proper to be observed.

The principal points in this treatment are, that one must always endeavour to lessen and soften the increasing dryness and rigidity of the vessels, which at length occasion a complete stoppage of the whole machine; that nourishment and restoration of what has been lost must be facilitated as much as possible; that stronger irritation must be given to the body, because the natural irritability is so much weakened; and that one must promote excretion of the corrupted particles, which in old age is so imperfect, and which therefore produces an impurity of the juices, that accelerates death.—Upon these are grounded the following rules:—

1st. As the natural heat of the body decreases in old age, one must endeavour to support and increase it externally as much as possible. Warm clothing, warm apartments and beds, heating nourishment, and, when it can be done, removal to a warmer climate, are all means, therefore, that contribute greatly to the prolongation of life.

2nd. The food must be easy of digestion, rather fluid

than solid; abundant in concentrated nourishment; and at the same time much more stimulating than would be advisable at an earlier period. Warm, strong, and well-seasoned soups are, therefore, beneficial to old age; and also tender roast meat, nutritive vegetables, good nourishing beer, and, above all, oily generous wine, free from acid, earthy and watery particles, &c., such as Tokay, Spanish, Cyprus, and Cape wines. Wine of this kind is one of the most excellent stimulants of life, and that best suited to old age. It does not inflame, but nourishes and strengthens: it is milk for old people.

3rd. The tepid bath is exceedingly well calculated to increase the natural heat, to promote excretion, particularly of the skin, and to lessen the aridity and stiffness of the whole frame.

4th. Guard against all violent evacuations, such as letting blood, unless when required by particular circumstances; strong purging, exciting perspiration by too much heat, indulging in excesses of any kind. These exhaust the few powers still remaining, and increase aridity.

5th. People, with increasing years, should accustom themselves more and more to a certain order in all the vital operations. Eating, drinking, motion, and rest, the evacuations, and employment, must have their determined periods and succession. Such mechanical order and regularity, at this season of life, may contribute greatly to the prolongation of it.

6th. The body, however, must have exercise, but not violent or exhausting. That which is rather passive will be the best, such as riding in a carriage, and frequent friction of the whole skin, for which sweet-scented and strong ointments may be employed with great advantage, in order to lessen the rigidity of the skin, and to preserve it in a state of softness. Violent bodily shocks must in particular be avoided. These, in general, lay a foundation for the first cause of death.

7th. A pleasant frame of mind, and agreeable employ-

ment for it, are here of uncommon utility; but violent passions, which might derange it, and which in old age may occasion instant death, ought to be avoided. That serenity and contentment which are excited by domestic felicity, by the pleasant review of a life spent not in vain, and by a consoling prospect of the future even on this side the grave, are the most salutary. The frame of mind best fitted and most beneficial to old age, is that produced by intercourse with children and young people. Their innocent pastime and youthful frolics have something which tend, as it were, to renovate and revive. Hope, and extending our views of life, are in particular noble assistants for this purpose. New proposals, new plans and undertakings, which, however, must be attended with nothing dangerous, or that can create uneasiness, in a word, the means of continuing life longer in idea, may even contribute something towards the physical prolongation of it. We find, therefore, that old people are impelled to this, as if by internal instinct. They begin to build houses, to lay out gardens, &c.; and seem, in this little self-deception, by which they imagine they secure life, to find an uncommon degree of pleasure.



## CHAPTER XIX.

Cultivation of the mental and bodily powers.

It is only by culture that man acquires perfection. If he is desirous of enjoying the pre-eminence of human nature, his spiritual as well as his physical powers must obtain a certain degree of expansion, refinement, and exaltation. In a rude and uncultivated state he is not a man: he is only a savage animal, who has certain dispositions which fit him for becoming a man; but as long as these dispositions are not expanded by culture, he is raised, neither physically nor morally, above the other classes of animals in the like situation. The essential part of man which he possesses is his susceptibility of perfection; and his whole organization is so ordered that he may either become nothing or everything.

The influence, therefore, which culture has in bringing to perfection the physical man, as well as in prolonging life, is highly worthy of attention. It is generally believed that all cultivation tends to weaken and to shorten physical existence; but this is the case only in regard to the extreme, for *hyperculture*, which makes man too delicate and refined, is as pernicious and unnatural as the other extreme, *want of cultivation*, when the faculties are not, or have been too little, expanded. By both these, the duration of life is shortened. Neither the man, therefore, who by culture has become too tender, or who leads too sensual or too spiritual a life, nor the rude savage, ever attains to that term of life which man is actually capable of reaching. On the other hand, a proper and suitable degree of mental and bodily culture, and, in particular, a harmonious formation of all the powers, is, as has been

already shown, absolutely requisite, before man can attain to that pre-eminence over animals, in his physical state and vital duration, of which he is really susceptible.

It is well worth the trouble to examine and explain more accurately the influence which real culture has in prolonging life, and to establish how far it differs from that which is false. In lengthening our existence it acts in the following manner :—

It expands the organs to perfection, and consequently renders life richer as well as fuller of enjoyment; and occasions more abundant restoration. How many means of restoration, unknown to the savage, has the man who possesses a cultivated mind!

It renders the whole texture of the body somewhat softer and tenderer; consequently lessens that too great hardness which impedes duration of life.

It secures us against those destructive and life-shortening causes which deprive many savages of their existence; such as cold, heat, the influence of the weather, hunger, poisonous and pernicious substances, &c.

By reason and moral formation it moderates and regulates the passionate and merely animal part within us; teaches us to support misfortunes, injuries, and the like; and, by these means, moderates the too violent and active vital consumption, which would soon destroy us.

It is the foundation of social and political connexions, by which mutual aid laws and police establishments become possible; and these have a mediate effect in prolonging life.

Lastly, it makes us acquainted with a multitude of convenience and means for rendering life more agreeable; which are, indeed, less necessary in youth, but which are of the utmost importance in old age. Nourishment refined by the art of cookery, exercise made easier by artificial helps, more perfect refreshment and rest, are all advantages by which man in a cultivated state can support life much longer in old age, than man in the rude state of nature.

From this it already appears what degree and what kind of culture are necessary in order to prolong life—those which physieally, as well as morally, have for their object the highest possible formation of our powers, but which are always regulated by that supreme moral law, to which everything, to be good, suited to its end, and really beneficial, must have a relation.

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THE END.

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TREATMENT OF DISEASES OF WOMEN."

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*Dr. James Johnson.*

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## PREFACE TO THE NINTH EDITION.

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Since the publication of the earlier editions of this work, several important discoveries have been made in the sciences of physiology, animal chemistry, and minute anatomy.

The necessary corrections, consequent upon these new discoveries, have been made in this edition. These, however, do not, in the slightest degree, affect any of the great general principles laid down in this work—excepting as so many additional proofs of their accuracy. The doctrines indeed lately promulgated by Liebig are singularly in accordance with, and confirmatory of, all that I have here said on the subject of alcoholic stimulants, as well as on the subject of the causes of *health and strength*. The following passages will put this in a striking light. “The cause of *waste of matter* is the chemical action of oxygen. The act of waste of matter is called the change of matter; it occurs in consequence of the absorption of oxygen into the substance of living parts.” “By the absorption of oxygen into the substance of the living tissues, these lose their condition of life, and are separated as lifeless, unorganized (disorganized) compounds.” “All experience proves that there is, in the organism, only one source of mechanical power; and this source is the conversion of living parts into lifeless, amorphous compounds”—(in plain lan-

guage, by the waste of the old body.) "Proceeding from this truth, which is independent of all theory, animal life may be viewed as determined by the mutual action of opposed forces; of which one class must be considered as *causes of increase* (of supply of matter) and the other as *causes of diminution* (of waste of matter.)" "All vital activity arises from the mutual action of the oxygen of the atmosphere and the elements of the food"—that is, waste and supply.

"That condition of the body which is called health includes the conception of an equilibrium among all the causes of *waste and supply*; and thus animal life is recognised as the mutual action of both; and appears as an alternating destruction and restoration of the state of equilibrium."\* Thus Liebig makes *waste*—the disorganization of the body—to be the first of the two causes which constitute the sole source of all vital activity and all animal mechanical power. The first cause is waste, the second, supply. Precisely the same doctrines are taught in the following passages from "Life, Health, and Disease." "Health and strength depend upon energetic contractility—energetic contractility depends upon rapid re-organization—rapid reorganization depends upon rapid disorganization—therefore health and strength *depend* upon rapid *disorganization*"—that is, waste of matter.

Again: "The operation by which life is supported may be illustrated by the operation by which motion is supported and communicated by two cog-wheels acting upon each other. Keep your eye steadily fixed upon the point at which the cogs of the two are interlocked. What do you observe? Why, that at every instant, the empty space which is presented by one wheel is instantly filled by a tooth or cog of the other wheel, to be almost immediately emptied again, and again re-filled. Thus it is that at every point of the body, and at every instant, little empty spaces are made which are immediately filled by the nutritive arteries, to be again emptied and again filled." This is intended to illustrate

\* Liebig's Animal Chemistry.

the mode in which the all-important process of waste and supply—"sole source of all vital activity, and all mechanical power" in the body—is carried on. And seeing that this process depends upon the presence of oxygen in the ultimate tissues of the organism, and that oxygen can only be carried thither through the medium of an active and vigorous circulation; and seeing further that the circulation can only be impelled to activity and vigour by virtue of bodily exertion, the immense importance of exercise as a hygienic and remedial agent, must be apparent to the most superficial thinker.

With regard to Liebig's opinion of the evil influence of alcohol on the human system, it is extremely gratifying to me to observe that they also are confirmative of my own views on the same subject. After dwelling, in various passages, on the fundamental importance of the "change of matter," as being the sole source of health and strength, he declares that alcohol has the direct effect of putting a stop to the "change of matter." "It is, consequently, obvious," says he, "that by the use of alcohol a limit must rapidly be put to the change of matter in certain parts of the body. The oxygen of the arterial blood which, in the absence of alcohol, would have combined with the matter of the tissues, or with that formed by the metamorphosis of these tissues, now combines with the elements of alcohol. The arterial blood becomes venous, without the substance of the muscles having taken any share in the transformation."

In the new view which I have taken of the source and mode of formation of the alvine evacuations, I am also supported by the doctrines of Liebig.

E. J.

*Umberslade Hall,  
near Birmingham.*



## PREFACE TO THE FIRST EDITION.

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Sometime since I received a letter from a very near relative, in which he stated, that he had been, for a considerable time, an invalid, labouring under a combination of the most dissimilar symptoms, all of which, he was assured, are represented by the term "indigestion." He complained bitterly that he could not obtain any satisfactory information as to the real nature of this Protean malady; nor as to the probability of his perfect and permanent recovery. When he questioned his medical attendants on the subject, they evinced every disposition to satisfy him; but they could not avoid making use of phrases which were to him words without meaning. These phrases were, nevertheless, only such as are in common and daily use among all classes—phrases which he himself had frequently used, and supposed he fully understood; but which he now found, when he strictly examined them, really conveyed no definite idea to his mind. He was told that his "digestion was impaired." He asked, what was meant by that; and was told, his "digestive apparatus was deranged in its economy." My brother was still no nearer the mark; and his medical attendant, observing his puzzled look, proceeded to explain and make the matter perfectly clear, by telling him that his "secretions were depraved, his gastric juice deficient, his



nutritive functions feebly performed, and that the tone, the energy, the *nisus formativus*—in fact, the *vis vitæ*—was fully twenty per cent. below par.” The enlightened patient bowed his gratitude for this luminous explanation, and sadly re-seated himself in his chair of sickness—as wise, perhaps, but certainly no wiser, than he was before.

Now, my brother is neither a profound scholar in mathematics, nor proficient in astronomy, nor an adept in chemistry; but he possesses what may be called a gentlemanly acquaintance with all these. That is to say, he understands the great general and fundamental laws which govern them; and therefore, if he were asked a question in any one of these sciences, although he might not be able to answer it, yet he would readily understand its nature and purport; and if the problem involved in that question were explained to him, he would have no difficulty in comprehending it. But not so with the science of health and disease, or rather that which teaches the nature of health and disease:—and the reason clearly is, because he knows nothing whatever of the fundamental laws upon which life depends—nothing whatever of the several actions which constitute life—nothing whatever of the intimate structure of the living organs. He knows neither how he lives, nor how he moves, nor how he breathes. The very language of the science is a dead letter to him; being borrowed, I verily believe, from every tongue that was ever spoken, and, for aught I know, from some that were never spoken at all. It is true he has some notion of the general appearance of a few of the larger organs, because he has seen similar organs in dead animals. For instance, he has seen a great reddish mass of flesh, and has heard it called a liver; and he has been told, that in the liver the bile is made; but beyond this vague and meagre notion he knows literally nothing. As to how it is made—*by what*, and *from what*—or what are the several steps and stages of the operation—as to all this, which constitutes the very kernel of the nut, and

without which the shell is nought, he is in worse than Cimmerian darkness.

Having read my brother's letter, and digested its contents, I was forcibly struck with the truth of his remarks, and felt that he really had just cause for lamentation. I then conceived that a small concise work, clearly explaining, in common language, the nature of the animal economy—the mechanics of the internal man—the mechanism of life—detailing, step by step, what actually takes place in the performance of each of the functions concerned in the preservation of life and health, and how, and by what causes, life is sustained—it struck me, I say, that such a work would be highly acceptable to the public, and would supply a desideratum in the elementary scientific literature of the country.

There is no mystery into which mankind are more curious to pry than into that of their internal structure;—and certainly there is none on earth which so nearly concerns them. There are many books written with a view to give men a general notion of the laws respecting their property; and it seems to me astonishing that there should not be one calculated to inform them concerning those infinitely more important laws which concern their health. Every gentleman is supposed to know something—the general principles, at least—of all the liberal sciences, excepting that particular one in which alone he has any really great and personal interest. I do think that such a work as I have attempted to describe (providing it were well and plainly written, and all technicalities and unnecessary minutiae carefully avoided) would be read with great attention and interest, and, I trust, profit by all classes. It would be read, I think, by invalids, in order to acquire some notion as to their own maladies, and so be better qualified to understand and practise the rules of regimen prescribed by their medical advisers: and it would occasionally be consulted, perhaps, by those who were

not invalids, in order to acquaint themselves with the best manner of preserving the blessing of which they were then in possession. I believe, also, that such a work would tend more than any other to induce men to practise those rules of conduct which are best calculated to preserve and promote health; because men are ever more ready to do this or that, when they can themselves clearly see and understand its necessity — and the manner how, and reason why, that necessity exists — than when they have no other authority than the dictum of another, however high their respect for his knowledge and judgment may be. Neither, as I think, should medical men take offence at the publication of such a work; as it would have a direct tendency to ennoble their profession—to render it purely scientific—and to divest it of that mystification by which it was formerly so much disgraced, and of which a portion still remains. If patients themselves had a clear general acquaintance with their own internal machinery—with the nature of the several offices intended to be fulfilled by the several parts of that machinery, and with the nature of disease in general; and if, with their mind's eye, they were enabled to look into themselves, and behold the complicated and delicate clock-work—every wheel in motion, every spring in operation—all acting in concert, and all tending to one purpose, yet requiring only the slightest imprudent interference to throw the whole into disorder and irreparable confusion—if, I say, they could see all this, they could not but feel and acknowledge that so beautiful, complicated, and wonderful a machine could only be regulated by the hand of a mechanic intimately acquainted with its minutest structure, and with the particular uses and manner of handling the several instruments necessary to rectify whatever derangement may have accidentally befallen it. It would also materially conduce to destroy the predilection of the public mind for quacks and quackery: for who that knows anything at all of the animal economy, and of the nature of disease, can for one instant be gulled into a belief that any one remedy

can be, at all times, good or proper, even for the same disease, and for the same patient? A bumper of brandy will cure the head-ache, providing that it be caused by a disordered stomach; but a glass of brandy, administered for a head-ache arising from inflammation of the brain, would, in all human probability, destroy the patient. And how is the patient to know from which of these causes his head-ache arises?

Such a work I have, to the best of my ability, executed—and I have done so in a series of familiar Letters, because I thought that it would afford me the best opportunity of employing a plain and conversational style, which is the more necessary when writing for readers who have no acquaintance whatever with the subject treated. For the same reason, I have avoided all professional pedantries and learned technicalities, whenever it could be done consistently with perspicuity; and I have described just so much, and no more, of the structure of the body as I thought sufficient to give the general reader a clear idea of those parts only which are concerned in the preservation of health. Thus, in speaking of the heart, I have divided it into two cavities—a right and a left; although, in fact, each of those cavities is again divided into two others. But, as a knowledge of this fact is not at all necessary to the understanding the general functions of the heart; and, as the description of this second division into cavities would necessarily involve another description of mitral, simular, and tricuspid valves, fleshy columns, tendinous cords, curtains, &c.—all of which would be “caviare to the general;”—I have thought it best to confine myself to the first grand division—the only one necessary to be known, in order to acquire a lucid notion of the course pursued by the blood. I pretend not herein to teach the anatomical structure of our organs generally; but only to exhibit the several changes necessary to nutrition, which are wrought upon our food within the *ultimate tissue* of those organs—and to show how those changes are effected.

Such are the nature and objects of the work which I now present to the public. Whether I have succeeded in achieving those objects, or not, must be left to the decision of the reader.



# LIFE, HEALTH, AND DISEASE.

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## LETTER I.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

In reply to your Letter, wherein you complain that you cannot gather any clear notion of the nature of your malady, because you cannot attach, in your own mind, any distinct idea to the terms which your medical attendants seem obliged to use in their endeavours to explain it to you; I am about to give you, in a series of Letters, a plain and familiar description of the mechanism of your internal man; together with a brief history of those internal motions and actions which constitute animal life, and any disturbance in the harmony of which constitutes disease. Thus, I think, I shall enable you easily to surmount the difficulty of which you complain. There is another benefit which I intend should result from these letters. They will, I hope, enable you to understand what are the habits of life which are most likely to conduce to a sound mind and a sound body. For if I were requested to teach a man how to regulate and repair his watch so as to make it keep true time, I should think the best way to

enable him to do this, would be to make him acquainted with the internal mechanism of a watch—showing him the uses of the several wheels and springs which keep his watch going. So, I believe, the best plan to teach men how to regulate their diet and habits of life, so as to make their health keep true time, is to make them acquainted with the mechanism of their internal selves—showing them the uses of the several organs and fluids which keep *life* going.

But, before we descend to particulars, it will be as well to take a rapid and brief, but general survey of the several parts which go to the composition of the animal, man. I say, the animal—because here we have nothing whatever to do with the higher attributes of his nature\*—attributes which have no connection with physical structure, and the phenomena of which are wholly independent of all physical laws. We are here wholly and solely concerned simply with the physical animal.

The method I shall adopt, in order to exhibit the principal systems of which the whole scheme of man is made up, and to show the relation which exists between them, and the dependence of one upon another, may be considered as fanciful. Perhaps it is so. But it struck me as one well calculated to render what I wish to say, easily comprehensible; and that circumstance alone is a good recommendation: for I am not ambitious of fine writing, either as it regards accurate arrangement, philosophical speculation, or learned and elegant diction. I am only anxious to be understood.

If man had been the work of any being less than

\* By which I mean—not the mind—not the reasoning faculties; but the soul—its immortality, &c.

Omniseient, the several single ideas composing the one complex idea of man must have occurred in succession ; and the first must have been the idea of his figure. The first idea could only have been, as I shall presently prove, merely that of an image or statue of the particular form and appearance which man presents. I am, of course, for the present, supposing man to have been the first animal produced, and that his artificer was some Being of inferior wisdom to that of Him who is, in truth, his real Author.

Having conceived the idea of a particular figure, and determined to realize it, the next point to be settled would be the kind of materials of which to fashion it. Having chosen bone, and shaped his image according to his preconceived idea, the first of a series of single ideas forming the one complex idea would be realized ; and a solid statue of bone would have been the result—a mere image of the human form.

Contemplating the work of his hands, the desire of endowing it with powers of locomotion might then occur to him. In order to accomplish this, the artificer would find it necessary, first, to divide the statue into parts, (re-uniting these parts by means of joints) and then to contrive a number of motive instruments, which, being attached to the jointed statue, would enable it to move—as the mechanic who wishes to move a heavy weight must first construct his instruments of motion, such as wheels, pulleys, levers, &c. Having effected this contrivance, the second idea of the series would be realized—the idea of the muscular system.

But when he had contrived and attached his muscles, he would find that the particular shape and general appearance, which he had predetermined his work

should bear, had been quite destroyed, and that these same museles attached to the outside of the statue were a terrible disfigurement of its external beauty and symmetry. To remedy this evil, it would be necessary to scoop and pare down, and hollow out, different parts of the image, and then to fill up these hollows with his museles; and thus restore those parts, which had been so cut down, to their original size, and again bring his image to its former shape and dimensions, by taking away a bulk of bone equal to the bulk of musele which he wanted to add. But still he would find, notwithstanding his museles, that his statue could not yet move, any more than a steam-engine can move merely because it has wheels, unless there be some power to set those wheels in motion. Hence would arise the third idea of the series—that of a nervous system, whose office it is to afford motive power to the museles, which are of themselves only motive instruments. This motive power is to the museles—which are, in fact, only so many pulleys, ropes, &c.—what the mechanic's hand is to the pulleys, wheels, &c.: it sets them in motion, and keeps them moving. And here, again, he would be obliged to hollow out another portion of the bone, in order to make room for the brain and spinal marrow, (from which nearly all the nerves arise) so that their attachment might not destroy the symmetry of his image. The nerves which arise from the brain and spinal marrow, and whose office it is to carry the motive power to the museles, he would of course distribute and conceal among the numberless little bundles of fibres of which the museles are composed. And this he might easily do, seeing that the nerves are merely small threads, and therefore easily concealed and em-

bedded in the soft parts, without producing any disfigurement or much apparent increase of bulk.

Again contemplating his production, it would occur to him, that the materials of which he had found it necessary to construct it were liable to decomposition and decay—putrefaction. To surmount this new difficulty, it would be incumbent upon him to contrive a conservative system : and hence he would arrive at the fourth idea—that of a system of nutrition. As the organs of this system are large and numerous, he would be compelled to hollow out the whole body of the statue, in order to make room for them, and put them out of sight ; leaving no more of solid image than just sufficient to support and give attachment to the several new contrivances which, in improving upon his original idea, he had been obliged to add.

Once more contemplating his work, he would now be delighted to see his new, animated, and improved statue moving from place to place, without assistance. His satisfaction, however, would be somewhat disturbed, by observing the grotesque, awkward, and uncertain manner in which it proceeded or rather zigzagged ; and very soon all his joy would be suddenly turned into consternation, by beholding his unhappy automaton all at once break its head against a post, or hop into a river, and vanish beneath the waters.

Having fished it up from the stream, or mended its broken head, it would now be tolerably clear to him that his new creation was not yet perfect. He would see that it was absolutely necessary to its safety that it should know when its path was obstructed by a post or a pond. This would suggest the idea of the organs of the senses ; being the fifth idea, and completing that



series, of which the complex one, represented by the words "animal man," is composed. By the organs of the senses, his object would be, to establish a certain relation between it and the rest of the world—to enable it to acquire ideas (by means of the experiences of these senses) of whatever was likely to inflict injury or afford pleasure, that it might seek the one and avoid the other.

In considering what senses were necessary, he would find that five were required. Having scooped away another portion of what little of the bony statue yet remained, and so introduced the eye and ear; and having found proper places for the addition of the organs of taste and smell; and thus having disposed of four out of the five senses required, he might be supposed to pause, from suddenly observing that there was yet an imperfection which had escaped his notice: for he would see that the external surface of his image was very unequal, from the many scoopings and hollowings which it had undergone—that, though these had been filled up by muscles, &c., they did not fit with sufficient accuracy to make all smooth—that some parts were soft, and others hard—that some were of one color, and some of another;—whereas the image, according to his preconceived idea, should have been, as to its external appearance, everywhere even, homogeneous, and soft to the touch. How was this imperfection to be rectified? Having still the fifth sense to add, he would resolve, it may be supposed, to make use of this sense to restore the image to its originally predetermined external appearance of homogeneous beauty. Instead, therefore, of making the sense of touch reside in a single organ, he spread it over the entire surface by means of

while from these smaller, others still smaller than they are continually separating; and so on, until the whole are finally lost in indistinguishable minuteness.

While the arteries are in this state of wonderful attenuation, their course is exceedingly tortuous; they recoil upon themselves; and are circumflexed hither and thither, until there is scarcely a point in the body which is not occupied by one of these little vessels. After having thus permeated the universal body, they lose the characteristics of arteries, and assume the structure of veins. The terminations of arteries, therefore, are the beginnings of veins. This termination of arteries in veins can be seen, by the aid of the microscope, in the frog and salamander. In some fishes it can be seen with the naked eye. The arteries near their termination, and the veins near their beginning, are many times smaller than the finest hairs; and, in this state of hairlike minuteness, they constitute that which is called the ultimate tissue of the arteries and veins;—and so, also, the tissue formed by the nerves and absorbent vessels, while in their last state of minuteness, is called the ultimate tissue of the nerves and absorbents; and that beautiful network formed by the interlacing of all these delicate and hairlike threads, viz. arteries, veins, nerves, and absorbents, in their minutest condition, is denominated the ultimate tissue of the body; and this ultimate tissue constitutes, in fact, nearly the whole of the body: for all that which appears to our eyes so firm and solid (not even excepting the bones) mainly consists of this astonishing network of minute vessels and nerves. This network, or ultimate tissue of the body, owes its compactness to its being firmly compressed and interwoven; to its being well

and accurately filled with fluid (principally blood); and to the circumstances of its being everywhere supported, held together, contained, and, as it were, closely stowed away in the cells of the cellular substance—now more properly called the areolar web, or membrane.

In order to obtain a clear notion of the cellular substance, its universality and appearance, just fancy it possible for an anatomist, with a finely pointed instrument, to pick away every part of your body, which is *not* cellular substance; what remained would be, of course, cellular substance only, and you would present exactly the appearance of a man made of honeycomb or sponge. But if this spongy relique of you were perfectly dried, it would be so light, that the sigh of a butterfly in love would be sufficient to scatter it to the four winds of heaven. Notwithstanding it pervades, therefore, the whole body, its actual quantity or weight is exceedingly small; and notwithstanding its resemblance to sponge when seen in the mass, when spread out and viewed under the microscope, it is observed to present the appearance of a spider's web.

I trust you have now a tolerably accurate idea of the ultimate tissue. If you have not, I pray you to refer back, and read again: and every now and then shut your eyes, and so endeavour to ascertain whether you clearly understand what you have just read or not, and by no means proceed to a second sentence before you have fully understood the first. Pardon this earnestness; and if I have been somewhat tedious or tautological, you must pardon that too, for I am extremely anxious that you should obtain a distinct conception of the nature of this amazing part of our structure; otherwise I shall have lost both my time and labour, and it

will be impossible for you to understand me when I come to speak of diet, the conduct of life as it relates to the preservation of health, the origin of disease, &c., all of which have a direct reference to this same ultimate tissue. It is, besides, the most beautiful, the most wonderful, the most important structure in the human fabric, magnificent in its very simplicity, stupendous in its very minuteness; and it is the secret chamber in which Nature conducts all her hidden operations. Hither are brought, and dealt with, by that subtle and mysterious Operator, all the elements necessary to the production of a Newton, or a Montaigne; a Howard, or a Robespierre; a Richard the First of England, or a Lewis the Eleventh of France; a genius, or a dunce; a martyr for religion, or a murderer for pelf. The physical is the father of the moral man; and it is quite true, "*Quod animi mores temperamenta sequantur*":—that morals depend upon temperaments. And no less true is it, that "Philosophy has been in the wrong, not to descend more deeply into the physical man:—there it is that the moral man lies concealed:—the outward man is only the shell of the man within." To alter a man's moral character, you need only alter his physical condition. Take the brave and hardy mountaineer from his hills—lap him in luxury—let him be fed on dainties and couched on down—let his lullaby be sounded by the "soft breathing of the lascivious lute," instead of the wild music of the whistling wind—you will soon reduce him, first physically, and then morally, to the rotund but helpless condition of the turtle-fed, yet imbecile alderman. In a few years replace him on his mountain-top—set him beside his former companions—show him the aggressor against his rights, the oppressor of his race

—bid him meet and repel the common enemy. Behold ! his courage has fled ; the love of liberty and independence is dead within him ; the spirit of freedom sleeps : he trembles, and yields, preferring the indolence of slavery to the toil necessary to preserve him free. It may be said, that courage is but one of the moral qualities : true, but it is one on which many others depend. Courage results from a consciousness of physical strength ; and cowardice, from a consciousness of physical weakness. The strong will not shun danger, because he feels himself competent to resist and repel it. The weak man, knowing himself unable to surmount danger by an exercise of strength which he does not possess, will resort to other means of preservation—to petty cunning, wily stratagem, mean subterfuge, lying and circumvention. Thus the virtues which are directly opposed to these vices all depend upon courage, at least to a considerable extent ; and courage depends on physical strength, the size of the heart and lungs, the firmness of the heart's structural fibre, and the liveliness and energy with which circulation and animalization are performed. The fortitude with which the Indian savage endures torture at the stake, I shall endeavour to show, by and by, is clearly the result of his physical condition. It may be objected that we have numerous instances of undoubted courage in men possessing but little physical strength ; but this objection will not hold. When the noble scion of a noble house, the nursling of luxurious ease from his cradle, goes out to fight a duel, is it because he loves danger for the sake of the pleasurable excitement it affords ? No.—Is it because he is indifferent to danger ? No.—What is it, then, which urges him on ? It is the fear of disgrace ;



it is the dread of being hooted from that sphere of society in which he moves ; it is his fear of the finger of scorn which impels him : this, therefore, is not courage—this is fear. If he refuse to fight, he knows that he will be degraded from his caste—his views, whether of love or ambition, will be destroyed. If he fight, he has a chance of escape, and if he escape, his character, as a man of courage, is established. His, therefore, is a choice of two evils ; and he chooses to fight as being the less evil of the two. If he could avoid both evils, most assuredly he would do so. But this is not courage. The mere act of fighting does not constitute bravery. It is the feeling, the inward feeling which he carries with him to the field—it is this which constitutes true valor. The rankest coward that ever lived will fight, when he knows that instant death attends his refusal, or that there is more danger in running away than in going forward. True courage loves danger for the sake of the excitement it affords—loves it for the same reason that men love wine—loves it, too, for the glory consequent on overcoming it. Had Richard the First not been the giant he was, would he have been the hero he was ? would he have courted danger as he did, alone, and single-handed ?

I have said, that many virtues depend on this single quality of courage. Richard possessed the ne plus ultra of courage, and he was high-minded and generous to a fault. He sought to accomplish all his ends openly, avowedly, and honorably, because he felt himself able to do so. His brother John was a coward : and how did he seek to accomplish his objects ? Why, by every species of low and cunning villany, not stopping even at murder. Had John been physically constituted as

Richard, and Richard as John, John had been called "the lion-hearted," and Richard "the craven coward."

Again, it may be urged, that on the field of battle men not physically strong have frequently performed feats of gratuitous and uncalled-for daring. But neither will this objection serve ; for at the time of performing these deeds of valour, their physical constitution is actually altered. The nervous system, powerfully excited by the senses, the trumpet's clang, the panoply of war, the martial music, the stir, the life, the uproar all around, pours into the heart a resistless tide, as it were, of nervous energy ; and the heart, obedient to the impulse, propels the blood in a stream of triple force along the arteries, until every organ of the body is in a state of the highest excitement, swollen and distended with the living current. Thus, for a time, the weak become actually strong ; and hence these instances of courage in the weak. The same thing occurs in anger. A man under the influence of rage not only appears to possess, but really does possess, triple the physical power which he can command when calm.

It must be remembered that a man may be physically strong, notwithstanding that he may have but a small development of muscle and bone. His brain and spinal cord, his heart, his lungs, may all be largely developed ; and this will give him a consciousness of strength—of internal strength—although the *instruments* of strength (muscle and bone)—the instruments to be set in motion by this internal strength, are deficient in size and substance. It is this internal consciousness of living strength which constitutes the difference between the high and low bred horse.

Not only, therefore, is the body constructed in the

ultimate tissue, but the eharacter is constructed there also. And as the health and strength of the body depend upon the healthy performance of the proeesses of assimilation in the ultimate tissue of the body, so also do the health and strength of the eharacter and mind.

“Who’d pique himself on intellect, whose use  
Depends so much upon the gastric juice?”

says Byron.

The moral qualities are therefore, at least to a great extent, the offspring of physical structure. I know that moral causes may, and often do, produee physieal disease: but this does not weaken the argument; for a child may destroy its parent; and so the moral qualities, though they result from physieal strueture, may nevertheless re-aet upon that structure to its detriment. The qualities of the mind, also, may be modified, improved, trained, and properly directed, by religion and education. So, also, may the child of one parent be nurtured and educated by another.

One of the most familiar instances of the influence of physical conformation on moral eharacter is to be found in the faet, that all the most courageous and feroeious animals have a heart remarkably large and strong in proportion to their size, while the weak and timid have hearts proportionally small. It is as impossible for an animal with a small, flabby heart to be bold and strong, as for two and two to equal five: and equally impossible is it for a man who is physically constructed to be a coward, by any aet of his own will, or of abstraet courage, to make himself a hero.

I am glad to pereeeive, by some late publications, that the truth of this doctrine is beginning to be

admitted ; and I trust it will not be long before parents can be made to understand, that the only certain method of assuring to children a vigorous and healthy mind is, first of all, to allow them the opportunity of acquiring a vigorous and healthy body. Let them be assured, too, that those who begin by cramming a child's memory (for judgment is out of the question) with a quantity of bad French and worse Latin, together with the terms and problems of the abstruse sciences—which, after all, they can only learn to repeat as the parrot does, by rote, without understanding ;—let them, I say, be assured, that those who thus begin, by seeking to make a child so very, very learned, will end, in all human probability, by making him sickly.

I have been seduced by this important subject into a long digression :—but let us return to the arteries and veins.

The arteries, ramifying in every direction, like the branches of a tree, from their common root in the heart, and having shot their minute and hairlike terminations into every part of the body, so that you cannot insert the point of the finest needle without wounding one or more of them, cease to be arteries and take the structure of veins. These hairlike veins (which are merely a continuation of hairlike arteries with an alteration in the structure of their coats) soon begin to unite two into one, to form larger veins. These larger veins again presently unite two or more into one, to form larger still, until all the veins of the body have united together, and so formed two very large ones, which empty themselves into the heart. One of the grand distinctions, then, between veins and arteries is, that while the arteries arising from the heart are multiplied in number and

diminished in size, until they have reached and distributed their blood to the ultimate tissue, the veins arising from the ultimate tissue are constantly becoming diminished in number and increased in size, until they have reached and carried their collected blood to the heart.

Another general distinction between arteries and veins is, that arteries alone possess any visible pulsation. The blood in the veins is driven onward by various circumstances extrinsic to themselves; such as the contraction of muscles around them, the pulsation of arteries in their neighbourhood, a dependent position, &c. The veins, therefore, have valves, which, when the blood has been squeezed forwards towards the heart, by the adventitious causes just mentioned, prevent its regurgitation, or gravitation backward.

I have said, that there is scarcely any point in the body which is not occupied by vessels and nerves. It follows, therefore, that there is scarcely any point of it which does not in great measure consist of vessels and nerves;—and this is true. When you look at a piece of red raw flesh, that which appears to you a solid mass is, in fact, mainly composed of a wonderful and compact tissue of nerves and hollow tubes, firmly compressed and matted together. The only solid parts are the nervous and muscular threads, a little areolar substance, and the delicate membranes forming the coats of those hollow-tubes; that is, the blood-vessels and absorbents;—and even these are porous—at least the blood-vessels.

What I have said of the red raw flesh, is also true of the bones, especially of young animals; for the internal structure of the bones is honeycombed and highly spongoid, and their cells are everywhere filled with



vessels and nerves. From all this there results another consequence; which is this—that so large a portion of the body consisting of tubes, and these tubes being filled with fluid, a very large proportion of the whole body must consist of fluid. This, too, is true. If you take a piece of human muscle (that is, what you call, in meat, the lean part) of the size and thickness of an ordinary beef-steak, and dry it perfectly, it will become but little thicker than a sheet of brown paper. In fact, fully nine-tenths of the body are fluid. The next large proportion consists of the solid matter composing the muscles, the nerves, and the coats of vessels. What remains is too trifling for consideration.

*Au revoir — adieu!*

E. JOHNSON.

## LETTER II.

*Umberlade Hall, near Birmingham.*

MY DEAR JOHN,

In my last Letter, I told you that by far the greater part of the body is composed of a delicate network, formed by the interlacing of minute arteries, veins, nerves, and absorbents; and I endeavoured to give you a clear notion of the manner in which the arteries and veins are distributed—how they arise, and how they terminate—the differences which distinguish veins from arteries—and also the differences which characterize the two kinds of blood which they contain and convey. I have now to speak of the absorbents and nerves; and explain the manner in which they are distributed throughout the entire body, so as to perform their share in making up that wonderful tissue, of which our organs consist.

The absorbents arise by cul de sacs from numerous points of the body and permeate almost every tissue. They may be compared to a number of long, slender, delicate leeches, attached by their mouth-ends to various points of the interior of the solid tissues; and having their bodies gradually and progressively united, until

they all terminate in one tail-end ; which tail perforates the side of one of the large veins near the bottom of the neck, on the left side ; so that whatever is taken in at the several mouth-ends is all gathered together into the one tail, and emptied by it into that vein, when it becomes mixed at once with the general current of the blood.

A certain and very considerable number of the absorbents arise from the internal surface of the bowels. It is the office of these to take up the nutritious chyle produced by each meal and convey it into the blood.

Now this chyle has somewhat the appearance, and also some of the properties, of milk ; and the Latin word for milk is *lac*—and, therefore, those particuilar absorbents which arise from the internal surface of the intestines, and which have to perform the duty of absorbing this *lac*, or chyle, are, on that account, called *lacteals*.

The fluid in the other absorbents has something the appearance of water ; and one of the Latin words for water is *lympha*—and, therefore, this fluid has received the name of *lymph* ; and on that account, those particular absorbents are called *lymphatics*, in order to distinguish them from the *lacteals*. For the sake of perspicuity, I shall call those absorbents which take up the chyle, *chylous absorbents*, and the others *lymphatic absorbents*.

Their course is not straight, but waving and devious ; and, as they proceed towards their termination, they are perpetually *inosculating*, that is, uniting, and again separating. They all eventually terminate and empty their contents into the veins.

It was formerly supposed that the office of the

lymphatic absorbents is, to take up molecule after molecule of the effete body, convert it into the fluid called lymph, and carry it into the blood; the office of the chylous absorbents being to suck up from the intestines the nutritious chyle, and convey that also into the blood for the purposes of nutrition. These two sets of vessels, therefore, under that supposition, might be compared, not inaptly, to two parties of labourers;—the one party being occupied in pulling down the old building, and carrying away the rubbish; while the other is equally busy in bringing into the blood new materials, wherewith to rebuild it as fast as it is pulled down; the new materials being carried to every part of the body by the arteries.

This was the doctrine of the Hunters. But modern discoveries, resulting from improvements in the microscope, have now utterly rejected it. It can now be almost demonstrated that the office of the lymphatic absorbents, like that of the chylous absorbents, is also to carry *nutritious* matter into the blood—the effete, that is, dead and useless matter—matters which can no longer serve any useful purpose in the economy—being absorbed by the *veins*, and by them transmitted to the several excreting organs, as the lungs, kidneys, and skin, by which they are separated from the blood and thrown out of the body. As it is the office of the chylous absorbents to carry into the blood certain nutritious matters furnished to them from the solid matters which we put into our stomach as food, so it is the office of the lymphatic absorbents to carry into the blood certain nutritious matters furnished to them from the solid matters of our own bodies. The chylous absorbents feed upon the food which we give them from

without. The lymphatic absorbents feed upon ourselves. They are man-eaters.

The food of the chylous absorbents—the food which we eat—is assimilated to the nature of chyle by virtue of certain changes wrought upon it within the stomach and upper portion of the small intestines. The food of the lymphatic absorbents—our own solid flesh—is assimilated to the nature of lymph by virtue of certain changes wrought upon it by and in the little cul de sacs, or cells, from which the mouth-ends of the lymphatics arise. And both the chyle and lymph are further assimilated to the nature of blood by virtue of certain changes wrought upon them in the lacteal and lymphatic tubes and glands.

It is the veins, therefore, which carry off the worn-out particles of the old body; and it is the absorbents (both lacteal and lymphatic), which carry into the blood the nutritious materials, in the shape of chyle and lymph, out of which the daily waste is to be supplied. All these nutritious materials are transmitted through the lungs (mixed with the common blood) to the left side of the heart, by which they are sent through the branching arteries to every point of the body.

As an absorbent passes onward from its origin towards its termination, it every now and then stops, recoils upon itself, and rolls itself up into an irregularly-shaped ball (varying in size from that of a millet-seed to that of a pea,) and then proceeds as before. While the absorbent is in the act of forming this ball, it is excessively minute. These balls are exceedingly numerous in the mesentery—that part which, in a lamb, is called “the fry:” they are generally to be



found in the neighbourhood of large blood-vessels, under the lower jaw, before and behind the ear, at the bendings of the knee and thigh, and in the arm-pit. These little balls are the absorbent glands; and there is scarcely an instance of an absorbent vessel reaching its termination in the veins without having first formed one or more of these glands.

Now, as these glands are merely a congeries of minute absorbent vessels, it is clear that the lymph and the chyle, which these vessels convey, must traverse these glands before they can enter the blood. The chyle and lymph are, in fact, strained through several of these curious little sieves; and this straining produces some necessary alteration in them, by virtue of which they become more nearly assimilated to the nature of blood, as before observed. I need not tell you, after what I have already said of the distribution of arteries and veins, that these latter vessels everywhere accompany, and interweave themselves with, the absorbent vessels and glands.

Now that you understand the nature of the offices and functions performed by the lymphatic and chylous absorbents, and the absorbing functions of the veins, you will easily comprehend what is called the *modus vivendi*; that is, the manner how we live; viz. in a state of perpetual decay and regeneration—a continual pulling down and building up again. The building up is effected by the minute capillary arteries, which carry and distribute the nutritious materials to every point of the fabric. The pulling down is accomplished partly by the agency of oxygen. The same arteries which carry the nutritious elements, also carry oxygen in combination with these very elements. At the

several points at which the body is to be nourished, a portion of the oxygen quits the nutritious elements and combines with a portion of the effete and useless matters, which combination of oxygen and effete matter is immediately absorbed by the veins; and a portion of the nutritious elements which have thus lost their oxygen leaps into the place just vacated by the effete matter. The other part of the pulling down is effected by the lymphatic absorbents, as before observed, and the points thus rendered vacant by the action of these absorbents are refilled by the remaining portion of the nutritious elements which have parted with their oxygen.

These compounds of oxygen with the worn-out body are transmitted by the veins to the excreting organs to be thrown out of the body.

There is not a square inch of you which is the same as it was ten years ago. That which was you, ten years since, is now not you, but something else;—it has been thrown out of the body, resolved into its original elements, has undergone new combinations, and is at this moment, perhaps, flourishing in the shape of some goodly water-dock or field-thistle; or more humbly, but still usefully, employed in stopping the bung-hole of a beer-barrel. “Alexander died; Alexander was buried; Alexander returneth to dust; the dust is earth; of earth we make loam:—and why, of that loam, whereto he was converted, might they not stop a beer-barrel?”

The fact is, that we are dying every hour, nay, every instant; and the only difference between this death and the final consummation of life (as far as it regards the body) is, that, in this hourly and gradual death, the

a most delicate and beautiful membrane (the skin); and wrapping the image in it, and seeing that it fitted with perfect accuracy, he would be gratified to find that he had killed two birds with one stone—that he had given to his image the desired appearance—and, at the same time, found the means of attaching the fifth sense without any more hollowing and scooping.

But these organs of the senses being of themselves only instruments (as the muscles of themselves are only instruments of motion), could be of no use, unless they were supplied by some other organ with the power of sensation. But he could find no room for any more organs, nor were more necessary; for he had only to take care that certain of the nerves should be distributed to them, and his organs of sense would be thus at once supplied with the power of perfectly fulfilling their respective offices, by means of a sensibility supplied to them by these nerves. So, again, some of the organs of nutrition, of which the heart is one, would have been useless, unless he had taken care that they also were properly supplied, by means of the nerves, with motive power.

Having contrived all this to his satisfaction, he once again, it may be supposed, carefully reviewed his work;—and having tipped the fingers and toes with nails, ornamented and protected the head and chin with hair, pencilled the eyebrows, and fringed the eyelids; and having furnished his jaws with teeth, and taught him how to use them; he would be glad that he had finished his work; for, I think, he must have found it a very troublesome affair.

I do not pretend to say that the several ideas composing the series would have occurred in the particular

order in which I have arranged them. I only say, they must have arisen one after another; and that of the mere image must have been the first: for, surely, it seems absurd to suppose that the idea of a peculiar set of instruments of motion could occur before the idea of something peculiar to be moved—that the idea of a peculiar system of nutrition should present itself before the idea of a peculiar something to be nourished—the idea of a peculiar source of motive power before the idea of a something to be put in motion;—or that the idea of a peculiar system of organs of sense, which may justly be termed organs for the admission of pleasure and avoidance of pain, should precede the idea of something to be pained or pleased.

Besides, all the other parts of the body are subservient to the mere image or skeleton; and we can assign a distinct purpose to every part of the body except this same skeleton. Thus, if one be asked, Why the muscular system exists? the answer is ready—to move the bones. Why the nutritive system?—to enable the bony edifice, together with its motive appendages, to resist decay:—and so of all the other systems. But if it be asked, Why was the skeleton created?—who shall answer the question? Its purpose cannot be simply to support the soft parts—this is only its secondary and adventitious use: for I have just shown that the soft parts are subservient to it, and not it to the soft parts. And, besides, I have proved that the idea of the bony image must of necessity have been the first to present itself, since all the other parts of the body answer no other purpose than that of conferring some service upon the skeleton or bony image.

To the Divine Artificer, however, the source of all

wisdom, and fountain of all that is good and all that is beautiful, and to whom nothing is impossible, nothing difficult—to Him the whole complex idea was present at the same instant of time: and therefore foreseeing, in His omniscience, all that which could only occur to a finite mind step by step, and little by little, He, from the first, provided against all exigencies, and fashioned man at once as he is.

Thus, then, we see that the body may be conveniently (at least for our present purpose) divided into five principal systems. First come the bones: secondly, the muscles moving these: thirdly, the nervous system, from which the motive power of the muscles is derived: fourthly, the organs of the senses, by which the being, thus endowed, discriminates between that which is conducive, and that which is detrimental, to his welfare; enabling him to seek the former and shun the latter; and establishing a due connexion between him and the objects which surround him: and, fifthly, the nutritive organs, nourishing and sustaining life in the whole.

Now what is my motive for dividing the body into its several systems, and for thus carefully showing you that all the other systems composing the body are only so many servants in waiting upon the bony fabric or skeleton? It is a very important one. It is this. It is in order to show you that the only difference between the animal man and other animals of the higher order, is to be found in the shape of his skeleton. It is the skeleton which constitutes and individualizes the animal. For all animals (at least of the highest order, and living in the same element) have, equally with men, the same kind of muscular system, the same kind of nervous system, the same kind of nutritive system, and



similar organs of the senses—and all these are, equally with those of man, subservient to the well-being and duration of the skeleton. They are different, it is true, in size and figure, but this is only in consequence of the difference in size and figure of the skeleton to which they are attached. I am particularly anxious that you should see and understand all this; because you will then be enabled to appreciate the force of those arguments, relative to the best manner of promoting the health and strength of man, which are drawn from the observation of those means which are acknowledged to be the best for promoting the health and strength of certain animals, such as the horse, the dog, &c., &c. You will then be able plainly to perceive, that if water be the best drink for a horse, so also it must necessarily—I say *necessarily*—be for man. Why? I have just told you. Because both animals are the same in physical constitution. The only reason which can be given why water and a vegetable diet are most conducive to the health of the horse, is because these are his *natural* drink and his *natural* diet. And seeing that there is no essential difference between the living economy of the animal horse and the animal man—seeing that, in this respect, they both belong to one class—it follows that if the natural drink of the one be the best for that one, so the natural drink of the other must be best for that other. For they are but two individuals of one class. Whatever is true of a class is true of each individual of that class. If, therefore, it be true that the drink which nature has provided for animals is the best they can have, it is equally true that the drink which she has provided for man (water) is also the best which *he* can have—he being (in all that

concerns his physical constitution) but a different individual of the same class. If nature had provided wine for man, then wine would have been (necessarily) the best possible drink for man, for the very same reason that water is the best possible drink for horses. If there had been any intrinsic difference between them—if the living actions of the one had been different from those of the other—it might then have been said that nature, in pity to the very small degree of art which the brute is capable of acquiring, took care to leave nothing to be accomplished by art. But that, foreseeing the very high degree of art which man, through his faculty of speech, would arrive at, she did, in his case, leave something to be artificially effected. It might have been said: “It is true that for those animals whose life consists simply in the due performance of the functions of absorption, secretion, circulation, and respiration, the drink furnished by nature is all-sufficient. But here—in man—there is another function of life, which the brute has not, and in order that this other function may be duly performed, it is necessary to have recourse to art. Thus much—the care of this particular function, distinctive and characteristic of human life only—nature has left to be provided for by the wisdom and ingenuity of men.” But I say there is no such distinguishing and characteristic function in human life.

But you will say—“Does not man, in his present artificial state, require a different drink—a stimulating one?” Most manifestly not—seeing that the very evil entailed upon us by our artificial state, is one of excessive stimulation—excessive cerebral excitement; of which that host of diseases, consisting of vascular

congestion, is the direct result. We are constantly blowing the fire all day long, and when the bellows are laid aside, during the night, or any other interval, the fire burns so dully that it is incapable of affording heat enough to perform the proper functions of a fire. Then we seize the bellows and begin to blow again, and thus we keep up a flickering and uncertain flame. But to insure a steady and efficient fire, the right way is, to rake out the dead ashes and cinders every now and then, to supply it lightly at proper intervals with good and proper fuel, and leave the rest to the natural draught of the chimney. The cook who is constantly blowing the fire will only waste coals, and will never have a good one.

The life of cultivated society is one of hourly excitement—the excitements of business—of emulation—of ambition—of reading—of writing—of quarrelling, &c., &c. The brain is constantly erect—throbbing with thought. What it wants is, quiet—time to recover its exhausted energies. If a man feel languid—dull spirited—enfeebled—it is because his energies have been overtasked. In such cases the remedy is rest—not still further stimulation.

And you will further see that if exercise in the open air be necessary to the health of a horse, so also it must be for that of man. And that if hot stables and warm clothing be injurious to the health and strength of the horse, so also must warm parlours, closed curtains, soft beds, and such other similar luxuries, be equally detrimental to the health and strength of man. It must of necessity be so, since the structural nature of the two animals is one and the same, saving only in figure and bulk; and since there is no difference—no, not so much

as the estimation of the millionth part of a hair—between the actions which constitute the life of a horse and those which constitute the life of man.

We have now taken a view, in the gross, of the several parts of which man is made up. But, in contemplating the new being, as we have seen him turned out of the hands of our imaginary Prometheus, has it not struck you, that something extremely necessary to his safety has been forgotten? Let us suppose that the first living thing he meets, after his creation, is a wolf, gaunt with hunger. He cannot flee from him; for the wolf is swifter than he: he cannot resist him; for the wolf is stronger than he: he must perish, for want of weapons of defence. In vain do his organs of the senses warn him of the approach of danger: he can neither shun it, nor resist it. What he still wants, then, to secure him in his existence, are weapons of offence and defence.

Here, then, is a new difficulty. How is it to be overcome? Man was originally designed, not only not to become the prey of the rest of the animal creation, but to hold every other animal under his own dominion—within his own power—under his own control, and at his own service. Nothing short of Omnipotence could effect it; and I know of no better proof of the divine origin of man, than the solution of the following problem;—man and the beast of prey being given, to give to the weaker dominion over the stronger. How beautifully, perfectly, yet simply, has the Almighty Ruler surmounted this difficulty. Man *speaks*!—and the problem is solved. By virtue of that miraculous little system of organs—the organs of speech—what an immeasurable distance is, at one instant, interposed

between the reasoning powers of the brute and his own! These enable him to add to the stock of knowledge resulting from his own experience, the whole stock acquired by the experience of his fellow-man. Thus he obtains innumerable ideas, which could never have been collected by the senses of one individual. These he combines, analyzes, recombines, compares, arranges. New ideas give rise to new pursuits, and new pursuits to new ideas. Thus his stock of knowledge is continually augmented, as his sources of ideas are multiplied; till his power, resulting from his knowledge, is only inferior to that of his Creator. The lion is lord of the forest; but man is lord of the lion. The stag and the antelope outstrip the wind; but man outstrips the antelope and stag. The most powerful of the brute creation become his obedient slaves. The tiger is hunted and slain, or entrapped and imprisoned, and his savage ferocity made subservient to his master's amusement and profit. Man's superior reason, therefore—which he owes chiefly to his faculty of speech—constitutes his weapon of offence and defence.

Φυσις κερατα ταυροις,  
 'Οπλας δ' εδωκεν ιπποις,  
 Ποδωκινην λαγωοις,  
 Λεουσι χασμ' οδοντων,  
 Τοις ιχθυσιν το νηκτον,  
 Τοις ορνεις πετασθαι,  
 Τοις ανδρασι ΦΡΟΝΗΜΑ.

“Nature hath given (for their weapons of offence and defence) horns to bulls, hoofs to horses, swiftness to hares, a cavern of teeth to lions; to fishes, the power



of swimming ; to birds, the power of flying ;—to man she has given *wisdom*."

"Man," says Geoffrey Crayon, "is naturally more prone to subtlety than open valour, owing to his physical weakness, in comparison with other animals. They are endowed with natural weapons of defence—with horns, with tusks, with hoofs, and talons ; but man has to depend on his superior sagacity."

I hope it is not necessary to tell you, who know me so well, that I consider the reasoning faculty as quite distinct from the soul, which I believe to be a portion of the divine essence, "*divinam particulam auræ*," inhabiting the body, but not subservient to any of its functions.—*Ου λογος, αλλα τι κρειττον*. "Not reason, but something better."

I have mentioned the reasoning powers of brutes. No one, I think, of the present day, who is accustomed to read, and think, and take note of the habits of animals, will deny their possession of this faculty. Everything which remembers, and regulates its conduct by this remembrance, performs an act of reason. Why should they not reason ? And that man owes his superiority of reasoning power to his faculty of speech, is most strikingly and irresistibly proved by the effect of the press. What is printing, but an extension of the powers of speaking ? Enabling a man, without moving from his native soil, to put his antipodes in possession of every new idea he acquires ; so that what one acquires is acquired by all ; thus multiplying the still newer ideas to which this newly-acquired one may give rise, by nearly the whole number of the reading inhabitants of the world : for almost every man will probably derive, from the combination of this new idea with one

which he already possesses, another new idea ;—and this other new idea is again told to the world through the press, and its results again multiplied as before. The first possession of the faculty of speech did not elevate man nearly so much above the brute, as this extension of it has lifted him above his former self. It must be remembered, also, that it is solely owing to this faculty of speech that men can *consult together*—an important advantage which is denied to brutes.

It may be objected that man has a larger brain than other animals, and that his superior ratioeivative powers may be owing to this circumstance. The objection may be answered in two ways. But I shall only answer it as though it were true ; for if it be true, it does not invalidate my argument : for if man possess a larger brain, it is only in consequence of his possessing the organs of speech. Because, that man should speak was a part of his original design ; and the Creator, foreknowing (as he foreknew and provided for every other exigency) that the faculty of speech would render a larger brain necessary for the reception of that multitudinous host of ideas which his vocal organs would enable him to muster—and in order that he might reap the full advantage which His gift of speech was calculated to confer upon him—has given him a magnitude of brain corresponding to his necessity. If he had not done so, he would have defeated his own purpose : he would have given him the means of acquiring ideas, without the means of turning them to account ; and man, as it regards his reason, would still have been but one remove above his neighbour, the brute. His superior magnitude of brain, therefore, (if he possess it,) and his superior ratioeivative faculties, are both alike

the consequence of his vocal organs. If it be true that he possesses a larger brain than other animals, this may be a *second* cause of his superior reason ; but his possession of speech still remains the *first* cause.

But it is manifest that the power of acquiring knowledge is not in proportion to mere magnitude of brain, for my lady's poodle is just as sagacious (if not more so) as my lord's coach-horse. And sagacity is but another name for knowledge.

There is a difference between the human brain and that of the brute. If an animal, having a larger brain than man, were endowed with the faculty of speech, although it would lift his ratiocinative powers to an elevation nearly equal to the grandeur of man's, it would not quite equal it. But this difference is to be sought for, not so much in superior magnitude, as in superior delicacy, elaborateness, and intricacy of structure—in the greater quantity of cineritious matter, and in the greater size and number of its convolutions. As this superior quality, like the supposed superior magnitude of man's brain, is only the consequence of his possessing articulating organs, my assertion still holds, that his enunciatory apparatus is the sole cause of his superior ratioeivative capabilities.

Now, my dear John, begging pardon for this long digression about the talking organs, and with a devout hope that your amiable wife, when she learns how much she owes to these little instruments, will be particularly careful never, by overtaking, to put them out of tune, and you out of temper, I will descend from generals to particulars.

Many years ago it was believed, by physicians, that our food was operated on by the stomach, pretty much

in the same way as shins of beef and ox-cheeks are dealt with by Papin's digester. It was supposed to be digested: that is, simmered, concocted, or stewed. When a man, therefore, felt himself strong and active, not oppressed after meals, and altogether in excellent health and spirits, this fine state of things was thought to be all owing to the circumstance of the stewing and simmering in the stomach having been carried on merrily and well, till it was done enough; and then, it was thought, the stomach handed over the stew to the bowels, thoroughly and properly cooked. But when a man, without any one very painful symptom in particular, felt himself generally indisposed, weakly, disinclined to action, low-spirited, and oppressed after eating; it was then said that his food had not been properly digested—in plain English, not properly stewed by the stomach; but that it had been left by that organ very much in the same state in which the shins of beef would be found after having been stewed over a bad fire, and in a cracked digester which let out the steam. He was said to be afflicted with indigestion! which signifies the unequal distribution of particles by stewing, or simply, imperfect stewing. Or, if his physician chanced to be somewhat of a pedant, the more learned word dyspepsia was used, which signifies difficult boiling.

You see, therefore, that when these queer words, digestion, indigestion, dyspepsia, digestive, &c. &c. were first introduced, viz. when physicians looked upon the stomach as little more than a living stew-pan, they had each a very distinct and definite meaning, and were used with perfect propriety. I mention this merely to account to you for the introduction of these strange words into medical language. That these words are

still used by medical men is of little consequence; because, although they retain the old words, they attach to them new meanings—meanings which by no means belong to the words, but which are perfectly understood among themselves. But with the rest of mankind the case is very different: for, as they retain the old words, they must also retain the old meanings, or else no meaning at all, which is by far most frequently the case; because they cannot be aware of the several great changes and improvements which medical philosophy has undergone. When these words, therefore, were first introduced, they were proper enough; but now that physicians have discarded “Papin’s digester,” and refuse to recognise any similarity between the uses of the stomach and those of the stew-pan—now that we know that the “stomach is neither a mill, nor a stew-pan, nor a fermenting vat, but a stomach, Gentleman, a stomach”—now, I say, all these words, as applied to any condition or action of any part of the body, are perfectly senseless and worse than absurd, because they are only productive of confusion—they ought, therefore, to be expelled from medical language; or if retained, they must, and indeed can only be understood in senses which do not properly belong to them. But we had better get rid of them altogether; for it is impossible to use them with the slightest shadow of propriety; and we shall have no difficulty in finding substitutes, each of which will carry its own definite and obvious signification.

From what I have said of the manner and reason of the introduction of these words, which we have just ejected from our vocabulary, you will easily understand how it came to pass that all those disorders to which



the term indigestion is applied, were supposed to exist in the stomach only; because you will have observed that it was in the stomach, according to the creed of our good forefathers, that all the stewing and digesting were carried on; and when the stew was not properly stewed, they never thought of looking to the fire or to the cook-maid for the cause; they only looked to the stew-pan, which they learnedly denominated "the digestive or stewing organ."

Now for our substitutes.—For the phrase "sound digestion" substitute perfect assimilation; for "indigestion" substitute imperfect assimilation; assimilating organs for "digestive organs:" assimilation of food instead of "digestion of food," &c., &c. The word assimilation is generally used by authors to designate that process by which the food, after having undergone all the necessary previous changes, ceases to be food, and becomes part and parcel of the living body; when that which was flesh of the dead ox becomes flesh of the living man, or bone, or hair, or skin, &c. &c., according to the nature of the different parts of the body to which it is distributed for the purpose of being assimilated. But, in fact, all the changes which the food undergoes are assimilating changes, all tending to that ultimate assimilation which converts the fluid blood into the solid body—in one word, its solidification. Thus the conversion of food in the stomach into chyme (learnedly called *chymification*) is its assimilation to the nature of chyme: its conversion into chyle (*chylification*) is its assimilation to the nature of chyle: its conversion into blood (*sanguinification*) is its assimilation to the nature of blood: and if we wish to particularize any one of these changes, we have only to name the organ in which it

takes place. Thus, if we wish to designate those particular changes which take place in the stomach, commonly called digestion, we have only to speak of them as "assimilation in the stomach."

Now that we have got rid of the word digestion, with all its stewing derivatives, and banished it from our own to the cook's vocabulary, to which alone it properly belongs, you will not be surprised when I tell you, that the stomach and bowels are by no means the only assimilating organs we possess. Every organ which is concerned in the nutrition of the body—and without a healthy state of which organ, nutrition cannot be properly performed—has a right to be called an assimilating or nutritive organ. I need not tell you that nutrition and assimilation are the same thing. Assimilation completed is nutrition completed; and the several assimilating changes in the food are only so many nutritive steps towards the completion of the process of nutrition.

I shall presently take a meal of food, and trace it, or rather follow it, through all its changes, until it has become assimilated, that is, until it has become part of the living body. In doing this, you will learn what are the assimilating or nutritive organs, what is the office of each, what the changes which these organs severally effect in the food, and in what manner they accomplish these changes.

It will be convenient to state here that two kinds of blood are contained in the body, differing from each other as much as any two things can well differ. The one is of a beautiful, bright, vermilion color, teeming with the living principle, pregnant with all those elements from which all the organs of the body are

nourished, and in a condition readily and instantly to part with those elements, each at the proper moment and in the proper place, accordingly as the nutrition of the several parts of the body requires them. This vermilion blood is, as it were, in a state of excitement, being surcharged, not with the principles of electricity, but with the principles of living matter; and, as it circulates through the minute vessels, parts with those living elements with the readiness and freedom with which a highly-excited body parts with its electricity. This blood is conveyed in vessels called arteries. The other kind of blood is a filthy, thick, purplish, blackish, inky puddle, unendowed with any good quality, endowed with many pernicious ones, productive of much mischief, but incapable of any one good with which I am acquainted; save only that from it the bile and the urine are formed. This blood is contained in vessels called veins. Some of the principal differences between arteries and veins are the following:—The arteries carry the living blood from the heart to every point of the body. The veins, like so many waste pipes, carry the deteriorated, dirty, and, if I may so speak, dead and useless blood, from every point of the body, back to the heart. The arteries, arising chiefly by one large trunk from the heart, become smaller and smaller as they pursue their course towards their termination in the veins. The veins, arising from the innumerable terminations of arteries, become larger and larger as they proceed towards the heart. The arteries, therefore, in the neighbourhood of the heart—from which, as I have just said, they almost all arise by one common root (the aorta)—are large and few; but from the sides of these there are perpetually given off smaller and smaller branches;

place of every dead molecule is instantly supplied by a living one; while, in the other case, all the parts of the body perish at once and together, and are not reproduced. You are, then, a new and a different being, exercising the same faculties, but doing so with different organs. You still exercise the faculties of vision, of hearing, and tasting; but the eye with which you now see is not the same eye with which you saw ten years ago; it is a new eye: and you hear with a different ear, and taste with another tongue. Indeed, the eye of to-day is not the same as that of yesterday; for a part of the eye of yesterday has been taken up by the absorbents, as food, and converted into lymph; and another part has been conveyed, first into, and then out of the blood, in the shape of perspiration, breath, &c.; while the deficiency thus produced in the eye has been supplied by a part of yesterday's dinner; so that you are now performing the act of vision with a part of the pudding which you ate at that meal. This is not romance, nor speculation, but a literal fact. Is not this, of itself, sufficient to show you the vast importance of the assimilating processes? Does it not clearly demonstrate to you the manner in which faulty assimilation operates, so as to injure the health and perfection of your organs? Is it not manifest, that if your assimilating organs do not perfectly assimilate your food, that the deficiencies produced in your eye, by the action of the absorbents and veins, will be either not supplied at all, or supplied with new matter, of an unhealthy quality; so that the new eye will not be so good and perfect as the old one?

From considering the functions which the chylous and lymphatic absorbents perform, together with the ab-

sorbing function of the veins and the property of combining with the elements of the worn-out body possessed by oxygen, you will readily understand why we grow in youth, and cease to grow in manhood. It is because, in youth, the building up processes go on more actively than the pulling down processes. In middle life they are in equilibrium. In old age the destructive processes exceed in activity the reparative.

While the manner in which the absorbent glands are formed is fresh in your memory, I may as well describe to you how the secretory glands are formed. This will give you an opportunity of observing the difference between the two; both as it relates to their formation, and to the functions which they severally perform. We have just seen that the office of the lymphatic and chylous glands is to operate some change upon the lymph and the chyle, which has the effect of assimilating them more and more nearly to the nature of blood. But the office of a secretory gland is to elaborate, or manufacture (if I may so speak), out of the blood, a new and distinct fluid; which new fluid is called a secretion; as, the bile, the saliva, &c. &c. Previously to the recent improvements in the construction of microscopes, everything relating to secretion and the secreting apparatus was little else than mere speculation. Now, however, through the agency of these instruments, speculation has yielded to ocular microscopic demonstration.

All the secreting glands are demonstrated by the microscope to consist of a conglomeration of minute cells, everywhere interpermeated by capillary blood vessels. The secreted fluid escapes from the blood



through the coats of these capillaries into these cells, from which it is collected into the excretory ducts which carry it to its place of destination.

This is the way in which all secretory glands are formed. Their size is extremely different, varying from the wonderful minuteness of the ceruminous glands of the ear, whose office is to secrete the wax—and which are, I believe, the smallest glands in the body—to the great magnitude of the liver, which is the largest. But a very large gland is, in fact, only a vast number of very small ones conglomerated into one mass, and united, and, as it were, glued together, by areolar tissue; and having their several minute excretory ducts united so as to form one, two, and sometimes three larger ones, into which the smaller empty themselves.

I have now to speak of the fourth principal structure which enters into the composition of the ultimate tissue of the body—I mean the nerves. The brain accurately fills the cavity of the skull. With its general appearance you are probably acquainted, from having seen the brains of animals.

The spinal marrow is a tail-like elongation of the brain; which elongation passes out of the head, through a round hole in the back part of the skull. So great is its resemblance to a tail, that it has been called *cauda cerebri*; that is, the tail of the brain.

From the brain and spinal marrow there arise forty-three pairs of nerves; twelve from the brain, and thirty-one from the spinal marrow. The nerves are whitish cords; and every large nerve consists of a bundle of small ones; and these small ones consist of bundles of still smaller, as a skein of thread consists of a number

of single threads, and as every single thread consists of a number of still smaller threads, viz. the fibres of the cotton. As a large nerve proceeds from its origin to its termination, every now and then one or more of the threads, of which it is composed, parts company, and takes a course of its own. As these proceed, one or more of the strands, of which they also are composed, disjoins itself from the fellowship of the others, and takes a course of its own : and so on, until the whole have been separated into microscopic filaments of undistinguishable minuteness. You will observe here a remarkable difference in the manner in which nerves are distributed from that in which arteries are given off. The branch of an artery arises from that artery : there is a communication between them ; so that the contents of the parent artery flow into the branch which proceeds from it. The larger veins, also, are formed by the absolute union of smaller ones ; so that the contents of the smaller flow into and mingle with the contents of the larger : but between the large nerves and the branches which proceed from them there is no union nor communication whatever ; they are merely in juxtaposition—a bundle of separate threads, bound up together, and inclosed in one common sheath. When, therefore, a nerve gives off a branch, that branch merely parts company, to travel along another road. Every nerve therefore, however minute, is a distinct thread ; having one of its extremities fixed in the brain or spinal marrow, and the other in that point of the body on which it terminates. If it were not for this peculiar arrangement, all our different sensations would be jumbled into one. If we touched a round body with one hand, and a square one with the other, before the

two impressions reached the brain they would become mingled ; so that the idea which we should derive from these two impressions would be a sort of hybrid idea of a something neither round nor square.

There is one pair of nerves, included by me among those arising from the brain, which possesses striking marks of difference from all other nerves : it is called " the great sympathetic pair."—I should have observed, that all the nerves are sent off from the brain and spinal marrow in pairs.—This pair of nerves has given origin to endless discussions ; some asserting that it arises from the brain ; others, that it does not ;—some, that it has one office, some, another. Fyfe says, " It is either formed originally by the reflected branch from the second of the fifth pair ; and by one or two, and sometimes three, small filaments, sent down from the sixth pair, whilst in the cavernous sinus : or, according to the opinion of some authors, the sympathetic sends off these small nerves to join the fifth and sixth pairs." Mr. Green says, " This nerve is so essentially distinguished from the other nerves of the body, that it may be described separately, or as a separate system of nerves."

" It consists," he says, " of a considerable number of ganglia (hardish knobs), of which the number and size differ, not only in different individuals, but in the same individual, on the two sides of the body ; and of branches, which in part connect these ganglia, or form junctions with the other nerves ; and are in part distributed to the internal organs. It extends from the base of the skull, on each side of the vertebral column (backbone), through the neck, chest, and abdomen, as far as the coccyx (that is, the lower extremity of the

backbone), forming from above to below, numerous ganglia: those in the neck are few in number; but in the rest of its course it generally forms one ganglion between every two vertebræ (bones of the back): these are severally connected, by one or more filaments, with each other, and with all the nerves of the spinal marrow; and the uppermost cervical ganglion (ganglion of the neck) is connected with most of the cerebral nerves (nerves of the brain). Lastly, it detaches filaments to the viscera (organs of the belly and chest); and those which are distributed to the abdomen (belly) form connexions with a numerous set of ganglia in this cavity, which are placed about the trunks of the large vessels."—Thus, Mr. Green traces it no higher than the base of the skull; but an anatomist has recently traced it completely round the brain; and thence downward, on either side of the spine, until that portion of the nerve which descends on one side of the spine unites with that descending on the other side, at the extreme lower point of the backbone. During its whole course, there are little knobs situated upon it, at short intervals; so that it has something the appearance of a cord with beads of different sizes strung upon it—or of a chain—or of a small knotted rope, with its two extremities joined so as to form a sort of necklace, as it (the necklace) hangs round a person's neck, falling gradually to a point in front. From the little knobs, or ganglia, numerous nerves are given off, which unite with almost all the nerves coming off from the brain and spinal marrow; and sending numerous filaments also to the organs concerned in nutrition; as the heart, lungs, stomach, bowels, liver, &c. &c. The little knobs with which the sympathetic is studded, have been con-

sidered by some as so many little independent brains, whose office it is to supply the organs of nutrition with motive power ; and they say that this arrangement was made in order to remove these organs beyond the influence of the will, which has its seat in the brain. The absolute necessity that these organs should not be under the control of the will, and the fact that they are not, together with the additional fact that this pair of nerves does supply them with motive power, seems, I think, to favour this notion. But, however this may be, it will be sufficiently accurate for our present purpose, to consider all nervous influence as derived from the brain, and from the spinal marrow, which is merely an elongation of the brain.

I have now given you an account of the general structure of the body—sufficiently brief and rough, but nevertheless sufficiently accurate and minute, to enable you to understand the nature of the several functions performed by the several organs of nutrition, whenever I have occasion to speak of these functions and these organs. This general structure is so simple, that you can never forget it. You have only to remember, that whenever you are considering and presenting to your mind's eye any part of the body—whether it be the stomach, the liver, the heart, the bowels, or the arteries and veins—whether it be the solid bones, a mass of flesh an inch thick, or a delicate filmy membrane no thicker than the gilding of your picture frames, it is still the same ; it is still nothing more than a matted congeries of arteries, veins, nerves, and absorbents, held together by, and wrapped up in, the meshes of the areolar web. Areolar web is a better term than areolar substance : for, when spread out, it has a good deal the appearance



of a spider's web, and has, moreover, of real substance, extremely little indeed.

Take four threads of different colors—a scarlet one, to represent the arteries ; a black one, to represent the veins ; a white one, for the nerves ; and a silver one, for the absorbents. Dip them in melted wax, and then roll them up into a firm ball. This will give you a rude idea of the manner in which minute threadlike vessels can be so arranged as to form a solid mass ; for it is easy to fancy three of these threads to be hollow tubes filled with fluid, like arteries, veins, and absorbents. The wax, which everywhere surrounds them and glues them together, will afford you some notion of the principal office of the areolar web ; which is to hold the different parts of the intimate structure of the body together, by entangling them in its meshes, as the wax unites the threads by virtue of its stickiness. If, instead of dipping the threads into melted wax, you had dipped them in a solution of phosphate of lime (which constitutes the hard part of bones), the ball, when dry, would have given no bad representation of the structure of the bones.

Now, suppose the former ball—that formed of the threads dipped in wax—to be submitted to a pressure capable of flattening it until it becomes no thicker than a film of tissue paper. This will show you how the same structure which forms the thick, solid, and gross parts of the body, may be so arranged as to form also its most delicate membranes.

A knowledge of the nature and structure of membranes is of the highest possible importance in all that regards the regulation of our diet ; for the stomach and bowels are lined with one of those most delicate, and

therefore extremely irritable, and highly sensible, and easily-offended membranes, called the “mucous membrane of the stomach and bowels.” It is with this membrane that all which we eat, and all that we drink, comes directly in contact. Here, then, is another powerful reason for caution in what we eat and drink. This membrane is little thicker than gold-leaf; and you know very well that you can scarcely touch a leaf of gold without injuring it—without deranging, and even tearing it. Remember when you are eating your dinner, that the membrane on which every mouthful falls, is little thicker than a leaf of gold.

In contemplating any part of the body—knowing as you now do, that it consists of arteries, veins, nerves and absorbents—you will please always to bear in mind what are the offices or functions which these structures severally fulfil. You will recollect that it is the function of the lymphatic absorbents to eat away the body—to *feed upon it*; that of the arteries (or rather the vital blood contained in them) to restore what the lymphatics have eaten away; and that of the veins to absorb and carry back to the heart the refuse of the blood; that is, what remains of it, after the arteries have done with it. When the blood has parted with its living elements while in the arteries, the veins carry it away, in order that it may receive a fresh supply of these living elements. But the arteries could not carry the blood from the heart, nor the veins return it to the heart, if they were not supplied with the power of moving. This motive power is afforded them by the nerves—or rather, a fluid conveyed by the nerves. This fluid, however, does not, I conceive, travel along the nerves like a tangible fluid in a tube, but like the electric fluid

along a wire. The nervous fluid, therefore, is to the organs of the body what steam is to a steam-engine. And as this fluid is conveyed by single filaments of nerves, it is clear, that wherever there is an artery, vein, or absorbent, there must also be a nerve to enable those vessels to convey their fluids, which they do by a motion of their own or of neighbouring parts.

You may conceive the universality of the nerves and blood-vessels by the fact, that you can scarcely insert the point of the finest needle into any part of your body without producing pain and bleeding ; which proves that the point of the needle has wounded both a nerve and a blood-vessel.

*Sis memor mei !*

E. JOHNSON.

## LETTER III.

*Umberslade Park, near Birmingham.*

MY DEAR JOHN,

I HAVE already described to you as much of the structure of the body as I believe necessary, in order to enable you to understand the nature of the several actions which are perpetually going on within that structure. It is of these actions that I have now to speak. But previously to a description of the actions peculiar to living beings, it seems proper to devote a few moments to an inquiry into the nature of life itself.

Writers on physiology\* are accustomed to enumerate

\* Physiology is an exceedingly improper term. It is used by the moderns to signify the science of life ;—*animal physiology* being used for the science which treats of the life of animals, and *vegetable physiology* being appropriated to the science of life in vegetables. But the term Physiology no more denotes the science of life, than it does the science of picking pockets. It means the science of nature; and it is as strictly applicable to the laws which govern inanimate matter, as to those which regulate the actions of living beings. This term, with regard to animal life, should be *Zoonomy*, which signifies that science which consists in a knowledge of the *laws of life*, and nothing else. With regard to the life of vegetables, the term should be *Phytozoonomy*, which means the science which makes us acquainted with the laws of *plant-life*, that is, the life of plants. "The endless introduction of new technical terms, on every frivolous pretence," says DR. FLETCHER,

the several distinctive differences which separate the organic from the inorganic kingdom of nature. These are, generally speaking, well marked, and sufficiently understood, by almost every one; although almost every one might not probably be able to give a scientific relation of them. To dwell upon these, therefore, would be foreign to my present purpose. But there are a few characteristics of organic matter, of such vast and immediate importance to all that relates to the preservation of health, that I must not omit to take especial notice of them.

One of the few attributes I shall mention, as peculiar to organized matter, is DEATH.

Death—"the dunnest of all duns,"—death,

"Sole creditor, whose process doth involve in't  
The luck of finding every body solvent."

has been so often personified, indeed, as something horrible—as some "gaunt gourmand," who is by every means to be eschewed—that we are apt to contemplate it as though it were a real entity—a sort of "raw-head-and-bloody-bones," whose chief amusement consists in stopping folk's breath. But I need not tell you, that all this is mere rhetorical delusion—one of the poet's "fine phrensies." Death is a sheer abstraction—the mere

(a new star in the Iatro-philosophical firmament, and a bright one too), "seems adapted much less to benefit than to injure the cause of Philosophy." True: but when the introductions are *not* endless, and the pretence *not* frivolous, an exactly opposite result will accrue. Nothing has tended so much to mystify science, and obstruct its progress, as the unsettled state of the exact meanings of words. Words are, through ideas, the signs of things; and if *one* word be used indiscriminately, as the sign of several things, how is the reader to know which thing of the several the writer desires to indicate? Dr. Fletcher has himself taken occasion elsewhere to complain, and that loudly, of this improper, indiscriminate use of words.



cessation of life. As the cessation of sound is called silence—as the cessation of motion is called rest—so the cessation of life is called death. Death, therefore, being only the abstraction of life, it is manifest that things which have never lived can never die.

Another condition peculiar and necessary to all matter intended to live is, organism—the consummate result of organization. Organism, in the common sense, is that state of existence in which the elements composing the germs of matter intended to live are held together by a property which may be called “vital affinity,” or “the affinity of vitality”—a property which enables it to resist the ordinary agencies of chemical affinities to which common matter is subjected. A seed is an instance in which a germ of matter intended to live (for a seed does not live—it merely possesses vitality, or the aptitude to live) preserves its integrity, in virtue of the vital affinity, and in defiance of the common chemical agencies. A melon seed, a hundred years old, will grow, if planted in a proper soil.

But the term organism is not only used to indicate a peculiar condition of the elements of matter, but also a peculiar condition of masses of matter. Here it signifies that state of existence in which masses of matter grow and preserve their integrity by virtue of a power which may be said to consist in the affinities of assimilation—a power withdrawing them from the influence of common chemical agencies, until they shall have accomplished the final cause of their organization—a power enabling them to assimilate other matter to their own nature and substance.\*

\* It is perfectly correct to call the assimilating processes by the term “affinities of assimilation.” For what is affinity, but an alliance or relation?

Another most important characteristic of living matter is its contractility; that is, not contraction, but the power of contracting: it is the being able to contract.

Now, Indian-rubber, or a steel spring, may be said to be able to contract. But then the one of these can only do it after having been put upon the stretch, and the other only after having been bent; they can only contract after having been put into an unnatural condition. In their natural condition they are, like all other inorganic matter, at rest; and can neither contract, nor expand, nor dilate, without being first submitted to the action of mechanical or chemical force. These, therefore, are merely elastic. But living matter can do much more than this. When at perfect rest, and in its natural state, it can contract, shrink, and, in short, perform spontaneous movements, merely on being excited, stimulated, or irritated, without the agency of any mechanical or chemical power. It does this by virtue of a property called contractility. When you look at a very strong light, the iris, the coloured part of the eye, being irritated by the rays of this strong light, contracts, and almost closes the pupil; that is, the black spot in the eye, which is, in fact, a round hole. When your will directs your arm to move, the muscles of the arm, stimulated (that is, excited) by your will, contract, and raise the arm accordingly. When the

And is there not a relation between the food and the body which it nourishes? Is there not an alliance between them? And what are the assimilating or nutritive processes or actions, but those actions or changes wrought on the food, by which its alliance to the body is drawn closer and closer, until they become identical? And so it is correct to say, that the proximate atoms of organic germs are *held together* by *vital* affinity; for this is *not* equivalent to saying they are *brought* together by vital affinity.

blood rushes into the right side of your heart, that part of the heart contracts, and pushes it into the left side : then the left side contracts, and pushes it into the aorta. All these contractions could not of course be executed, if it were not for the property of contractility—that is, the ability to contract.

Now, all the motions of the different parts of the body, without and within, are performed by these contractions, and by virtue of this contractility. It is the main-spring of the watch—it is the chief wheel in the machine—it is the principal beam, the main prop, of the building : by it we gather our food—by it we eat it—by it we swallow it—by it the stomach sends it on to the bowels : from the bowels it is carried to the heart by it ; and by it having become blood, it is circulated through the body, for whose nourishment it is destined. Whenever, therefore, I use the term contractility, you will know that I mean that power by virtue of which the several parts of the body are able to move, and perform those actions which are proper to them.

A third property, distinguishing organized from inorganized matter, is sensibility.

This is exceedingly slippery ground, and rendered still more dangerous by the darkness in which it is enveloped. I shall therefore hasten off the ice as quickly as possible, lest some invisible straw or other should trip up my heels.

“Irritatio,” says Glisson, “est percceptio, sed sensatio est pereceptio perceptionis;” that is, “Irritation is perception, but sensation is the pereception of a percception.” Said I not it was slippery ground? But Dr. Fletcher, speaking of this definition of Glisson, says,

“for either terseness or accuracy, it cannot, perhaps, be improved.” To me, however, I confess, it has very much the appearance, not of splitting a hair—that is but a trifle—but of splitting the very ghost of a hair, which is no trifle. Lobstein defines sensibility as “*facultatem stimulum percipiendi*,” that is, “the faculty of perceiving a stimulus.” You probably know that anything which irritates or excites any part of the body to action is called a stimulus. I think Lobstein is right. Thus the heart, by virtue of its contractility, has the power of contracting; but it is by virtue of its sensibility that it perceives the proper moment for exerting this power—the precise when to contract; viz. when the blood stimulates it by its presence, as it rushes into its cavities. Sensibility, therefore, is that property of organized matter by which it becomes aware of an impressing cause—by which it perceives when it is acted upon by a stimulus.

In vain would the heart be organized—in vain would it be endowed with contractility (that is, the power of acting)—were it not also endowed with sensibility; that is, the power of knowing when to act—of feeling the presence of a stimulus. The several stimuli may be likened to a number of messengers sent out from “head-quarters,” the heart, in order to tell the several parts of the body when to act; and the arteries are the roads along which they travel—the principal stimuli within the body being the countless streams of blood continually flowing through its arteries. You must remember, however, that this office of stimulation is by no means the main duty which the blood has to perform: it is only an adventitious office—only one of the numerous functions which the blood performs. Besides

the blood, there is another remarkable stimulus—another messenger sent to certain parts of the body, to summon them to action ; which is sent, not from the heart, but from the brain. This messenger is a strange, incomprehensible being ; and his name is *Will*.

Comparing organized matter to a musical instrument, and its aptitude to act, i. e. live, to that instrument's aptitude to sound, one might liken the stimulus offered by the blood to the performer, whose office it is to play upon that instrument.

These two properties, sensibility and contractility, constitute vitality. I say vitality—not life.

And here allow me to caution you against the common error of confounding vitality with life. The term “vitality” no more signifies life, than the word fiddle signifies music. Vitality signifies, not life, but livability (if I may coin a word) ; that is, the aptitude or fitness to live ; as musicality (if I may be allowed to coin another word) would denote, not music, but the aptitude or fitness to give rise to musical sounds. Vitality is a secondary cause—a necessary condition of organised matter, in order to give rise to living actions ; as musicality would represent a necessary condition in a fiddle, in order to give rise to musical sounds. A fiddle may be perfect in all its parts, and yet, for want of this necessary condition, which I have called musicality, be wholly unable to produce musical sounds. For instance :—if you were to fill the body of Paganini's best fiddle with sand, and soak its strings in tallow, Paganini might go mad, perhaps ; but twenty Paganinis, or one Paganini with a twenty-Paganini power, which is the same thing, would not be able to extract from it a single musical tone. Why ? Because the instrument would



have lost that necessary condition which I call musicality—the sand and the tallow have destroyed it. “En caput ; sed cerebrum non habet ;”—which, being interpreted into the vulgar tongue, for the benefit of “ears polite,” signifieth, “There is the fiddle ; but where is its aptitude to discourse most excellent music ?” I will make this clear in a moment. The first condition necessary to life is organism—that is, the fiddle ; the second is vitality, or that condition or manner of existence necessary to the production of living actions—that is, the musicality, or that particular mode of a fiddle’s existence necessary to the production of musical sounds ; viz. perfect freedom from sand and tallow, and all other impediments to musical sounds. And, as we have just seen that a fiddle may exist perfect in all its parts, and yet be wholly destitute of musicality, and therefore entirely unable to emit sound ; so organized matter may exist, and yet, for want of vitality, be wholly unable to live. I know a man who has a very large wen, situated on the back of his head. If this wen were shaven off, it would still for a time remain perfectly organized—but it could no longer live. Why ? Because it would have lost its vitality—that condition necessary to life, which, in this instance, would be an endowment derived from its connexion with the rest of the man’s body.

And again : as organism may exist without vitality, so may vitality without life. Seeds are an example of this. A grain of mustard-seed does not live : in it there is neither motion nor fluid ; and it is utterly impossible for a moment to conceive the existence of life without both these. But it possesses the aptitude—the ability to live—that is, vitality ; and if you plant it

in a proper soil, it actually will live, and become possessed both of fluid and motion. A grain of sand, on the contrary, possessing neither organism nor vitality, will remain a grain of sand for ever—plant it in whatever soil you please: at least, it cannot undergo any changes but such as are purely chemical or mechanical.

As vitality is not life, then, so neither is it organism, but merely a condition of the latter, necessary to the existence of the former. Life, then, being neither organism nor vitality, what is it?

“Life,” says Richerand, “consists in the aggregate of those phænomena which manifest themselves in succession for a limited time in organized beings.”

“Life,” says Dr. Fletcher, in one of the most erudite, elegant, and ingenious works that ever fell from the press—“life consists in the sum of the characteristic actions of organized beings, performed in virtue of a specific susceptibility (vitality), acted upon by specific stimuli.” These two definitions are perfectly contemporaneous with each other; and to them I have nothing to add. Life, like death, is not an entity: it is merely an aggregation of effects. To say what life is, is only to enumerate all the actions of which a living being is capable; not only the visible actions, as of the members, but also the molecular actions, as those invisible motions among the ultimate and proximate molecules of the matter of which he is composed, and by which his nutrition is effected. Life is, to organism, contractility, sensibility, and stimuli, what chemical phænomena are to chemical affinity—what astronomical phænomena are to the centrifugal and centripetal forces, and the antagonization of these forces by each other—what the motion of the hands of a watch is to the mainspring and its

elasticity; viz. the sum total of numerous effects, of which these four attributes of organic matter above-mentioned are the secondary causes. These effects we call living actions—actions, the totality of which constitutes life.

Organized matter is a harp, of which vitality is the musical power: stimuli are the fingers of the performer: and life is the music produced—a hymn, day and night, in praise of the goodness and power of HIM, who permits

“This harp of a thousand strings  
To keep in tune so long.”

Such is life.—Now, what is health?

As life consists in the aggregate union of all the living actions, and indifferently, whether those actions be well or ill performed; so health consists in the aggregate union of such only of those actions by which nutrition is carried on—and not indifferently, whether they be well or ill performed; but exclusively when they are well performed. And disease consists exclusively in their being (one or more of them) ill performed, or not performed at all.

You will now readily understand of what tremendous importance to health are the properties contractility and sensibility; for, as health consists in the due performance of certain actions, and as these actions depend on contractility and sensibility, it is clear that they will be feebly or energetically performed, accordingly as these two properties are themselves in a healthy condition. You will also see, that the stimulus which the blood offers to them is of vast importance likewise. This stimulus is a sort of messenger, sent to summon them to action. In proportion as the summons is feebly

delivered, it will be faintly heard, and feebly obeyed. Contractility and sensibility are like a horse that gallops furiously, moves sluggishly, or goes to sleep entirely, exactly in proportion as the stimulus of the whip is gently or vigorously applied. Like the horse, too, the faster they are urged forward by the whip, the sooner they become tired;—like him, they may be driven even to death;—like him, they require rest and repose. Do not therefore be led to undervalue the importance of these properties, because of the playfulness with which I have occasionally spoken of them; as, for instance, in the allusions to Paganini and his fiddle. “*Ridentem dicere verum quid vetat?*” What reason on earth is there for always telling the truth with a grave face? Why should we not sometimes tell it with a smiling eye, as well as a scowling brow? Gravity is not wisdom; nor a smile, folly. Besides, if to smile be a folly, what then? “*Qui vit sans folie, n’est pas si sage qu’il croit,*” says Rochefoucauld. He who lives without folly is not so wise as he believes himself.

Organism, then, is that arrangement of the component parts of matter which fits it to be endowed with contractility and sensibility. Contractility is that property which endows it with the power of executing living motions. Stimuli are impressing causes, acting on its contractility, and exciting it (organized matter) to action; and sensibility is the property by which it perceives the presence of these impressing causes.

The muscles of your arm are organized, and they possess contractility and sensibility: and when you resolve to raise your arm, your will becomes an impressing cause, exciting those muscles to action; that is, to contract. Their sensibility makes them aware that this

impressing cause, or stimulus, (*viz.* the will) is acting upon them; and they contract in obedience to it; and your arm is raised accordingly.

I trust, my dear John, there are now clearly depicted on the canvass of your mind, four distinct and well-defined ideas, representing organism, contractility, sensibility, and stimuli; and that you plainly perceive their intimate connexion with each other, and the necessary co-operation of all, in order to produce the phænomena of life. As to stimuli, when you consider the literal meaning of the word, you will have no difficulty in understanding that modified sense in which it is used in the language of science. It means, literally, a long stick, with a sharp point, with which husbandmen were wont to goad their oxen along, in times and countries when and where oxen were used for agricultural purposes.

Now these properties, contractility and sensibility—these important properties, upon which, it is manifest, life depends; and without a healthy condition of which the health of the body can no more be preserved than the true motions of a watch can be maintained with a broken or otherwise injured main-spring—these properties, I say, are subject to certain laws. I am now about endeavouring to establish these laws; or rather, I am going to endeavour to convince you of their existence. That they do exist, is a truth that has been well and incontrovertibly established and admitted among all men acquainted with the animal economy, the effect of medicines upon it, &c., &c., ever since Hippocrates practised physic at Athens; and that is more than two thousand years ago. But it is not sufficient that medical men are aware that these laws exist;—my object is,



to convince you of their existence. I want you to know what is good and what injurious to your health; not from my dictum, but from the simple exercise of your own reason.

I beg that you will consider what I am about to say on the subject of these laws with great attention;—examine the proofs and arguments carefully, but fairly. For I tell you, at the outset, that if you admit the existence of these laws, you will not afterwards be at liberty to question or doubt the truth or propriety of what I shall say with regard to diet and regimen. For the existence of contractility and sensibility are like the axioms of Euclid;—they are self-evident truths, of which any one may convince himself by experiment. For instance, a dead man may easily be made to move his limbs, to breathe, to frown, &c., by exciting the appropriate muscles to contract by means of galvanism. And the laws to which these properties are subject, and of which I am now to speak, are, if I prove them, of the nature of the propositions of the First Book of Euclid. If these be true, the propositions of the Second Book must be true also, of necessity—the truths of the Second Book arising out of the truths of the First. As, for instance, if you admit that twice two are four, you must of necessity also admit that the half of four is two. So if you admit what I am about to say of these laws, you must also admit the propriety of what I shall hereafter say as to diet and regimen; as the correctness of the latter will depend solely upon the correctness of the former. When I come to apply these laws to the subjects of diet and regimen, I repeat, that either what I shall say then must be true, or what I am about to say now must be false.

As all the actions of the body are performed by contractions, and as these contractions are performed in virtue of the contractile power, that is, contractility, it is evident that the physical strength of the body—that strength by which we raise heavy weights, walk, run, leap, &c.—will be in proportion to the energy of the contractile power. A high degree of contractile power, then, is synonymous with strength; and a low degree of contractile power is synonymous with weakness.

But not only are the motions of the limbs performed by contractions, but also those motions of the internal organs by which nutrition is effected. Now, this being the case, and as these internal contractions are also performed in virtue of the contractile power, or contractility, it is again manifest that the energy with which these internal motions are performed (and by which nutrition is effected) will be also in proportion to the energy of the contractile power: and as health consists in the due energy (as we have before seen) with which these motions or actions are effected, it follows, clearly and logically, that a high degree of contractile power is synonymous with a high degree of health; and that a low degree of contractile power is synonymous with feeble health.

Having premised the above short paragraph, I now proceed to mention to you the first important law to which contractility is subject, viz. *evanescence*. Contractility can only exist in perfection in recently-organized matter. No sooner has a molecule of matter become organized and assimilated to the living matter, than its contractility begins to fade—to evaporate, as it were, like breath which has been breathed upon a highly-polished surface, such as steel, or looking-glass.

Indeed, it seems to be the evanescent nature of contractility which has given occasion to that particular contrivance by which life is supported; viz. by constant organization and disorganization; that is, perpetual building up and pulling down. For if contractility could continue to exist in full energy, in an organized body, during the whole time that body was destined to exist, what necessity was there for this constant renewal—this constant disorganization and reorganization—this constant pulling down and building up?

The evanescent nature of contractility may, I think, be accounted for thus:—It seems to have been a predetermined law of nature, that the only permanent condition of matter should be the inorganic condition. Nevertheless, certain ends in the general scheme of creation were to be fulfilled which required for their accomplishment the existence of organized matter. But, in order that organized matter might not be permanent, and so destroy or neutralize that original law by which it was enacted that there should be no permanent condition of matter except the inorganic, all organized matter was made subject to the laws of fermentation and putrefaction, as they are usually called; whose office is to destroy its organism, and bring it back to its original inorganic condition. But if this had been all that was done, the objects for which matter had been organized could never have been accomplished; for no sooner would matter have become organic, than it would instantly have begun to be disorganized again, by virtue of the laws of fermentation and putrefaction, to which it has been made subservient. But the ends to be answered by organized beings required time—required a continuity of

existence, in a perfect state of organism, for a determinate period. It was necessary, therefore, that there should be another contrivance, in order to withdraw organized beings beyond the influence of the laws of putrefaction and fermentation for a definite time; that is, until the purposes for which it had been organized should be accomplished. The phænomena of life exhibit this contrivance—a number of temporary phænomena, set up in order to withstand the phænomena of fermentation and putrefaction for a limited period. But, since the phænomena of life resulted from contractility, and because contractility can only reside in full activity in very recently organized matter, it was necessary, in order to make the matter of an organized being a fit residence for vigorous contractility, that it should be continually renewed; that, while the whole being, as a being, grew older and older, the molecules of which he is composed should, nevertheless, be always young. And thus we observe in the aged, in whom the process of renewal goes on but feebly, and in whom the laws of fermentation and putrefaction are gradually gaining the ascendancy over the laws of life—the laws of that contrivance which was instituted in order to remove living beings, for a time, from the influence of fermentation and putrefaction—we observe, I say, in the aged, that contractility is greatly diminished—it has waned, it has faded—their strength is greatly reduced—they are no longer a fit residence for active contractility; since this property can only reside, in its perfection, in very recently-organized matter; whereas, in the old, organization goes on very slowly and imperfectly. On the contrary, in children, contractility exists in a very high degree; because, in them, the process of organ-

ization goes on with great rapidity. A child will romp about on its legs for a whole day, without feeling fatigue; and can endure exertion far longer than a man, when we take into consideration the comparatively small size of the child's muscles.

It is a law, then, of contractility, that in order to its perfection, it is necessary that the molecules of the parts in which it resides should be rapidly reorganized—in a word, that they should always have a plentiful supply of healthy and well-vivified blood; for it is out of the blood that the solid body is repaired—reproduced.

Another proof of the evanescence of contractility is, the physical weakness which invariably attends total inaction.

Another law of contractility is this: It is in perpetual strife with the laws of fermentation and putrefaction. This law arises necessarily out of what I have just said; viz., that life is a contrivance to withdraw, for a time, organized beings from the influence of fermentation and putrefaction. It is proved also by the fact, that healthy living beings cannot putrefy—that the universal solvent, the gastric juice itself, has no power to dissolve living animals when accidentally taken into the stomach—that living beings, in whom life and strength (that is, contractility) are at a very low degree indeed, as in putrid fevers, do begin to putrefy partially—and that all beings who have lived are instantly acted upon by the fermentative and putrefactive forces, as soon as contractility has left them: observe, *not* as soon as life has left them; for contractility will sometimes remain for a short time after life has ceased. Contractility, you



must remember, is not life, but one of the secondary causes from which life results.

Another law of contractility is, that it is in an inverse ratio of sensibility. When contractility is vigorous, sensibility is dull ; and when contractility is deficient, sensibility is acute. This will be proved, when speaking of the laws of sensibility.

In my next Letter, I shall speak of certain laws and characteristic facts peculiar to sensibility. Till then, adieu !

E. JOHNSON.

## LETTER IV.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

I AM now to speak to you of certain laws, or circumstances, by which the sensibility of the body is materially influenced.

I have elsewhere noticed, that it is by means of the organs of our senses that a proper relation is established between ourselves and the various natural objects with which we are surrounded. It is by means of these that we are able to appreciate the value of these objects, and their power of affecting us, whether injuriously or beneficially. It is by these organs that we are able to discover the means of avoiding whatever is hurtful, and of selecting and securing whatever is necessary to our comfort and well-being. The eye warns us of the approach of danger from before ; the ear, from behind ; while the senses of smell, taste, and touch, enable us to decide upon the qualities of whatever matters are presented to us for food. But the medium through which these organs are enabled to render us these important offices, is their sensibility. For if the eye were insensible to light, we could not see—the ear to

sound, we could not hear—the nose to odours, we could not smell—the tongue to flavours, we could not taste—the skin to touch, we could not feel. In literal fact, then, you see it is sensibility, after all, which establishes this necessary relation, of which I have spoken, between ourselves and surrounding objects; the organs being no more than the instruments by which sensibility exerts its influence. Sensibility, then, is our guardian angel;—it is, like the sailor's "sweet little cherub," an invisible agent, that for ever watches over "our lives and safeties all."

Every organ has a kind of peculiar sensibility of its own. Thus, the sensibility of the eye is not affected by the stimulus of sound; nor can the sensibility of the ear take cognizance of the stimulus of light. The nose is insensible to the stimulus of flavours, and the tongue knows nothing of odours. From this it follows, that the sensibility of each organ is adapted to be properly affected by certain stimuli only. All others than these will either not affect it at all, or affect it painfully and injuriously. Thus sound, being a stimulus proper to the ear, but improper to the eye, will affect the ear properly, but the eye not at all. Again, salt is a stimulus proper to the stomach, and, when it comes in contact with the membrane which lines that organ, it affects its sensibility agreeably and healthily; but if you blow salt into your eye, it will produce the most violent pain; yet the membrane which lines the stomach is as delicate in its texture as that which covers the eye. Thus, again, there are certain medicines which exert their influence only on certain organs. Some will act on the stomach, some on the bowels only; some on the kidneys, some on the brain, some on the liver. If you

rub belladonna into the skin of your leg, it will not affect your leg ; but you will be astonished to discover that you have suddenly become blind. This once occurred to a patient who was under the care of the late Mr. Abernethy for a sore leg ; Mr. Abernethy having ordered the sore to be dressed with the extract of belladonna. The man, however, recovered his sight.—Mr. Abernethy never dressed sore legs with belladonna again. I heard him relate this circumstance myself.

Every organ, therefore, has a peculiar sensibility of its own, and can be properly affected by certain stimuli only—all others, if they affect it at all, affecting it injuriously : and the evidence of the impropriety of a stimulus is the pain, or some other inconvenience, produced. Hence arises a corollary ; viz., that whatever stimulus produces pain, or other inconvenience, is an improper stimulus. The pain, for instance, produced by blowing salt into the eye is sufficient proof that salt is a stimulus not proper to that organ, and cannot, therefore, be applied to it without injury.

This peculiar, distinctive, or eclectic, sensibility is impaired by over-stimulation. Thus we may be deafened by excess of sound, and blinded by excess of light. Everybody knows too, that snuff will produce, in persons not accustomed to it, violent and painful sneezing ; while those who have been accustomed to it for some time can take the strongest kinds with apparent impunity. Again, persons who have never smoked tobacco will generally be sick when they first begin to do so ; but after a short time they can smoke pipe after pipe without apparent inconvenience. If a person not accustomed to drink anything stronger than water were to swallow a glass of whisky, it would almost

choke him ; while a Scottish Highlander will toss off glass after glass, not only without inconvenience, but with a most pleasant gusto.

Now, what have these persons done—these pipe-smokers, and dram-drinkers ? Why, as far as the organs in question are concerned, they have, by blunting their sensibility, actually thrown dust into the eyes, and partially blinded that very “ cherub,” whose sole business it is to watch over their safety.

When a man, for the first time, swallows a glass of raw spirit, his guardian angel, sensibility, tells him—not indeed in a language that can be heard, but in one far more impressive—a language that can be felt—tells him, I say, as plainly as pain can speak, that raw spirit is an injurious stimulant. Yet what does he do ? Why, turns a deaf ear to the intimation which could be, by possibility, no other than a friendly one, and obstinately perseveres till the voice that warned him warns him no more ;—and then, with a folly scarcely less than idiotic, and an impudent hardihood scarcely less than blasphemous, he exclaims :—“ Behold ! it does me no harm ! it gives me no pain ! it causes me no inconvenience !” thus appealing, in his defence, to the silence of that voice which he has himself forcibly silenced. This is abominable !—Let every man drink what poison he pleases ;—of this I do not complain :—but let him not attempt to defend the practice : for this is to allure others into the same trap which is already closing its iron teeth upon his own hapless person.

But, luckily for us frail mortals, when this natural sensibility has been only impaired—not utterly destroyed—it can be restored by rest, and only by rest ; that is, by ceasing to stimulate it. A few common and well-



known facts will be sufficient to prove this. If a man has taken snuff for ten years, and then left it off for ten years, should he begin again, he will be as much affected by it as he was at the first pinch. If a man spend an hour in the belfry of a church while the bells are ringing, when he comes down he will be almost deaf for a time: shortly, however, he will recover his hearing. If a man look at the sun for a minute or two, when he first looks aside he will not be able to distinguish objects: he will, however, presently recover accurate vision. If a man has drunk spirit till the lining of his throat has no more sensibility than the lining of a copper-kettle, let him desist for a few months, and it will be restored. If a man have fed on highly-seasoned soups, piquant ragouts, and other French abominations, until he can discover no flavour in dry bread, let him be sent to Brixton tread-mill for a month, and he will discover that a penny loaf is a delicious morsel. But I need not multiply instances;—your own recollection will furnish you with abundant proofs, that the way to restore impaired sensibility is to allow it to remain for a time unstimulated.

Another peculiarity of general sensibility is, that it can be accumulated in one organ—drawn from all other parts of the body, and concentrated, as it were, in one. The insensibility to pain (I mean of course comparatively) which madmen possess, is well known; and several remarkable proofs of this are given by Dr. Hibbert, in his “Philosophy of Apparitions”—a book which you, and every one else, ought to read. We know, too, that persons under the influence of engrossing attention may be spoken to, and even plucked by the skirt—“plucked by the ear,” as Horace says—

without their perceiving it. There are irresistible proofs of this to be drawn from natural history, but it would be improper to mention them in a work like this. We know, too, that when any one part of the body is in great pain, the rest of the body is nearly insensible to lesser pain. This fact has given rise in the Tonga islands to a curious operation for the cure of traumatic locked-jaw. It consists in inflicting on the wretched patient, in some part of his body, a pain, the anguish of which shall be greater and more excruciating than the tetanic agony : thus, as it were, restoring the equilibrium of the sensibility ; and subduing a great pain, by inflicting, for the time, a much greater. The operation is said to have been successful : but the operators complain, that they can get few patients to submit to it. Sensibility, then, can be drawn from one part of the body, and concentrated in another.

Another curious circumstance connected with *sensibility* is *sympathy*. All the organs of the body appear to sympathize with one another. That the brain and stomach have a strong sympathy with each other is absolutely certain : the proof of which is, that a violent blow on the head will produce vomiting ; and a deranged state of the stomach will produce head-ache. Whatever, therefore, affects your stomach injuriously, will also affect your brain injuriously. He, therefore, who ill-treats his stomach, does so, not only at the expense of his bodily health, but at the expense of his understanding also ; that is, at the expense of his mind's health.

From this law of sympathy, then, it follows, that you cannot injure any one organ of the body without also injuring, to a certain extent, the whole of the body.

and the mind also. And, indeed, when we consider the intimate connexion which exists between all the organs of the body, and the reciprocal dependance of all upon each other—when we remember that all the nerves have one of their extremities fixed in one or other of the great nervous centres and their other extremities distributed to every point of the body—when we recollect that all the organs are made up, not of separate networks, but of different portions of one and the same universal tissue—when we consider this, there seems nothing surprising in the existence of this sympathy. The body, although composed of numerous parts, forms, nevertheless, one harmonious whole; and you cannot remove one part without injury to the whole. And again, although each organ performs a distinct function or office, yet it cannot do this without the co-operation of others. Thus, the stomach can exert no influence on the food, unless it be well supplied with blood by the heart. If the brain die, the heart must cease to pulsate; and if the heart cease to move, the brain must necessarily perish. It is not, then, by any means surprising that an injury to one organ should be felt by another;—on the contrary, it would be very wonderful if it were not so. Accordingly, we see that a wound of the foot will often produce locked-jaw;—the disease, in this instance, being at one extremity of the body, while the wound that produced it was inflicted on the other. If it were necessary to make this mutual dependance of all the organs on each other still clearer, we have only to recollect, that it is impossible to injure any one wheel of a watch without injury to the whole machine—without incapacitating it properly to fulfil the office for which it was intended. And man, the master-miracle

of nature, is a machine of far more delicate and complicated structure than a watch, and therefore more readily deranged.

Now, if no organ concerned in the preservation of health (for it is of these I am speaking—the organs of nutrition) can be disordered without disordering all the others, how much more certainly (if this were possible) will it be the case, when the stomach, one of the most important of these organs, as well as the first which is called into action in the process of nutrition, is kept in a state of almost perpetual excitement and unnatural activity. How can it be conceived to be possible that the other wheels of the machine can go aright, when this, the very first wheel which is put in motion, and on which the motions of all the others depend, goes wrong?

Let this, then, be engraven an inch deep on the tablet of your memory—that you cannot injure *one* of the organs of nutrition without injury to the whole.

I now come to the last law of sensibility which I shall mention; and it is, where all are important, the most important. Therefore, my dear John, draw your chair, put your feet upon the fender, snuff the candles, adjust your spectacles, and read with attention: for I deny it—no man can read attentively who has not first fixed himself in a comfortable position.

This is the law; viz., that sensibility is always in an inverse ratio of contractility. When contractility is vigorous, sensibility is low; and when contractility is feeble, sensibility is always acute; and as vigorous contractility is synonymous with health and strength, the greater or less degree of sensibility becomes an infallible test of the state of the health.

I have already proved that it is the sensibility of our organs which establishes the necessary relation between ourselves and the objects which surround us. From this it follows directly, that it is upon sensibility that all our pleasures and all our pains depend: for there is no pleasure and no pain which is not derived to us from impressions made by external objects upon our feeling—of which feeling, sensibility is the soul. I mean the feeling as well of the mind as the body.

Now, the sensibility of a perfectly healthy man, is so regulated, as to afford him the greatest possible degree of pleasure with the least possible amount of pain; that is, consistently with his terrestrial existence. Indeed, our pleasures are the voluntary and bountiful gift of nature. For our pains, we have nobody to thank but our foolish selves. So good has the great Governor of the Universe been to us, that we could not, if we would, escape pleasure; but in almost every instance, we can avoid pain, if we will: for pain is only a warning voice, intimating to us that we have got into a false position—that we are doing something which we ought not to do, or leaving something undone which we ought to do;—in a word, that the proper relation between ourselves and surrounding objects has been, for the time, destroyed. Man, if he would but be content to be what nature made him, need scarcely know what pain is.

But we have quitted the position which she appointed for us—we have forsaken the habits which she allotted to us—we have disregarded her tokens—derided her counsels—broken her laws—overleaped her boundaries—and now that we are paying the penalty for our frolic, we stand gaping at each other like fools, and wonder what is the matter! Why, we are like Rabelais' wooden



legs—we are like square men that have got thrust into round holes! No wonder we are uneasy—no wonder we suffer pain—we don't *fit* our position.

Nature, then, has endowed us with a certain degree of sensibility: and my object is, to show that we cannot increase this without diminishing our proper amount of pleasure, and augmenting our proper share of pain—without enfeebling our contractility; in a word, without injury to our health and strength.

Pain is invariably the result of impressions too acutely or strongly made: and, as sensibility is that property by which impressions are felt, it is perfectly manifest that the more acute sensibility is, the more acutely impressions will be felt. And thus those impressions, which in a healthy state of the sensibility afford only pleasure, become painful; and those which always produce pain become more painful. This is so very clear as to render amplification wholly unnecessary.

In order to prove, that wherever there is a high degree of sensibility, there is always a low degree of contractility, i. e. strength—and that, wherever there is a low degree of strength, there is always a high degree of sensibility—you need only look through the world.

Let us first approach the couch of sickness. Tread lightly;—for the slightest noise makes the poor sufferer start, and gives him the headache. Be careful to close the door after you; for the faintest breath of air gives him cold. See how he is shading his eyes with his hand! for the few rays of light which struggle feebly through the venetian blind are painful to them. Observe his hand: how white and bloodless! If you take it in your own, you must handle it as you would an

infant's—an ordinary pressure will make him cringe with pain. His banker has just failed, and reduced him to ruin; but you must not breathe a syllable of this in his hearing!—it would kill him. Do you observe that rope suspended over the bed from the ceiling, with a small cross-bar of wood attached to the end of it? So faint is the contractility of his muscles, that he could not, without this contrivance, raise himself in bed. Observe him, as he carries his cup of gruel to his pallid lips! Mark how the liquid quivers in the vessel! Hark, how its edge rattles against his teeth, as he applies it to his mouth! The contractile property of the muscles of his arm is so feeble, that they have not power to keep the limb steady, even while he carries nourishment to his mouth. His heart, too, contracts so feebly, that it cannot send the blood far enough to reach the skin. It is this that makes it so deadly pale;—it is this, too, which makes him shiver on the application of the slightest current of air.

In the above picture you will observe two things: first, that the contractility of the invalid has almost entirely disappeared, leaving him powerless; and, secondly, that his sensibility is so acute, that those impressions of light, sound, touch, &c., which under ordinary circumstances were only necessary to the enjoyment of existence, have now become sources of painful suffering; thus proving that whenever sensibility is advanced beyond the natural standard, the sources of pain are multiplied, and those of pleasure diminished; and that wherever sensibility is excessively high, contractility (that is strength) is excessively low.

It is true, that this is a case of extreme illness, and that every departure from health will not produce this

extreme state of things. But it will produce an approximation to it. In the slightest departure from health, the same effects will be produced; the only difference being in degree.

To prove this—let us take a peep into “my lady’s chamber.” Here you will find the same circumstances of heightened sensibility, and depreciated contractility, which you observed in the sick-room—only in a less degree. It is true, that she can bear an ordinary degree of light without pain, and that the sound of your foot-fall may not give her the head-ache; but if you leave the door ajar, she will most likely take cold;—if the force of your friendship cause you to press her hand a little too forcefully, she will assuredly scream;—and if you steal slyly behind her, when she thinks she is alone, and cry, “Bo to a goose!” she will in all probability fall into hysterics. If you press her arm strongly between your finger and thumb, you will make it black and blue;—while it would require, in order to produce the same effect on one of Mr. Barclay’s draymen, little less than the gripe of a blacksmith’s vice. “The hand of little employment hath the daintier sense.”

So much for her sensibility;—now for her contractility. Could she carry a bushel-basket of potatoes upon her head, for a mile, without resting? Not she. Yet why can she not? It is true, she is a lady; but, as Burns says,

“A man’s a man for a’ that.”

And is not a woman a woman for a’ that? There is many a woman, neither so tall nor so well proportioned, who would carry a bushel of potatoes on her head, with-

out resting, from Penny Fields to Pedlar's Acre, and think herself well rewarded with a shilling. There must be some better reason for this great difference, than the mere fact of one being a lady, and the other a woman. The true reason is, that the contractility of my lady's organs, especially her muscles, has sunk exactly as much below the natural standard as their sensibility has been elevated above it.

Thus, then, we have indisputable proof that sensibility and contractility are always in an inverse ratio of each other. But you must be careful to observe, that it is not increased sensibility that gives rise to diminished contractility; but it is diminished contractility that increases sensibility;—increased sensibility being no more than the proof of diminished contractility; that is, enfeebled health and strength.

From this it follows, therefore, that the degree of sensibility depends upon the degree of contractility; and this is fortunate, for we have on that very account only to raise contractility, in order to lower an irritable, acute, troublesome, and unhealthy degree of sensibility to the natural standard. This can be easily done; so easily, that I will undertake, within one month, without fee or reward, or pill or potion of any kind, and on the peril of my head, to enable any lady within the pale of the United Kingdom of Great Britain and Ireland, to carry a bushel of potatoes on her head from Penny Fields to Pedlar's Acre without resting, and that with no more pain and labour to herself than may be sufficient to spare her pocket the expence of sixpenny-worth of rouge.

Now, then, it is quite clear, that whatever causes, circumstances, regimen, or conduct, have a tendency to

heighten sensibility, must necessarily have a tendency to depress contractility; since I have proved that a high degree of the former is wholly incompatible with a high degree of the latter, and therefore cannot exist in conjunction with it.

The reason why a high degree of sensibility cannot exist in conjunction with a high degree of contractility is this;—the nerves (which are the seat of sensibility) are more or less actually sensible, according to the greater or less degree of firmness with which they are compressed on all sides by the parts immediately surrounding them and in contact with them. Thus the nerves of the bones, ligaments, and sinews are so firmly compressed on all sides by the unyielding structure of these parts, that they are almost wholly insensible. You may cut them, lacerate them, without giving pain. The muscles (that is, the red flesh) cannot be wounded without considerable pain, because their structure is not so firm as that of the bones, sinews, &c.: but it is much more compact and firm than the structure of the skin, and therefore a wound inflicted on a muscle will not produce anything like the acuteness of pain which is felt on wounding the skin. In the nerves of the eye and the ear it was necessary that a sensibility of the very highest degree should exist, in order to enable these organs to feel the very slight and subtle impressions of light and sound. Accordingly, we find that from these nerves all surrounding pressure is removed entirely; these nerves being, as it were, expanded into a sort of quivering jelly at that part where they are destined to receive their natural impressions.

Now, a very large portion of the body is, as you know, made up of a conglomeration of blood-vessels.



The whole body, then, taken as a whole, will be the more compact and firm accordingly as these vessels are fully distended with blood;—precisely as sponge becomes a more compact body when distended with water than when dry; since, when dry, its cells are filled with air; but when saturated with water, they are filled with water, which is a far more compact material than air. If you draw a thread through a sponge saturated with water, the sides of that thread will be everywhere compressed and supported by either the solid parts of the sponge or by the water: whereas, if you draw a thread through a dry sponge, whenever that thread passes through an empty cell, its sides will be entirely unsupported and uncompressed. So of the body;—a nerve passing through the body (which body consists of a congeries of vessels) will have its sides everywhere compressed and supported, so long as those vessels are well filled and fully distended. But if these vessels be half empty—if their sides be allowed, as it were, to collapse and fall away from the nerves which they everywhere surround—it is manifest that those nerves will not be so firmly compressed and well supported, as they were while all the vessels surrounding them were fully distended. It is this half-filled state of the vessels which constitutes that lax and soft state of the body called flabby. This loose, flabby, and uncompact state of the body, therefore, is highly favourable to sensibility; since sensibility is always increased accordingly as surrounding pressure and support are removed from the nerves.

But a state of the body the very opposite to that just described is alone favourable to contractility: for I have before proved that vigorous contractility can only

reside in recently organized matter; and in order that this recent organization—this perpetual youth as it were—of the several parts of the body may be kept up, an abundant supply of healthy blood is absolutely indispensable. Thus contractility in perfection requires a highly-distended condition of the blood-vessels, and consequently, a firm and compact state of the body—a state exactly the contrary of that just described as favourable to the development of sensibility. Hence arises a most important corollary; viz., that whatever increases the natural vigour of the circulation, increases the contractility and lessens the sensibility of the body: and whatever lessens the sensibility of the body, by increasing its contractility, increases also the natural vigour of the circulation; since the blood is circulated by virtue of the contractile power of the heart and arteries.

The degree of sensibility, therefore, is always, not only in an inverse ratio of the degree of contractility, but also of the circulating power: and since all the motions of the body are performed by virtue of contractility, and the whole process of nutrition by the virtue of the circulation, this is the same as saying that the degree of sensibility is always in an inverse ratio of the degree of health and strength;—which is the fact.

A very familiar instance of the increase of sensibility produced by lessening the quantity of the blood, is to be found in the fact, that a dose of cathartic medicine wholly incompetent to affect the bowels under ordinary circumstances, will be found quite sufficient to do so if administered after blood-letting.

I am at this time attending a huge, strong, dread-

nought-looking custom-house officer, for a slight attack of paralysis which he sustained some weeks since. Since the attack, I have bled him nine times, taking away thirty ounces of blood each time; he was also once cupped by Mr. Comley of Osborn Street. You may easily imagine that a man who can bear this, and yet walk about the streets without support, must, at least, be no chicken. Yet so much has his sensibility—(I speak now of moral sensibility, which, after all, is but the physical sensibility of those parts of the nervous system which are susceptible of moral impressions)—so much, I say, has this man's sensibility been increased by bleeding, that a cross word is sufficient to make him burst into tears.

As moral sensibility is but the sensibility of those parts of the system which are capable of being impressed by moral causes, it follows that the qualities of the mind will be, in a great measure, regulated by the relative degrees of contractility and sensibility in individuals. When the brain and nervous system are but ill supplied with blood, and that blood but feebly circulated, and therefore imperfectly vivified, the sensibility to moral causes or stimuli will be morbidly acute. Such a person is easily and morbidly affected by causes to which others are wholly insensible: a sudden loud knock at the door, for instance, will make him start almost from his seat.

If you speak to him of a contingent evil, however slight and remote, he views it through a mental telescope, always applying that end of the instrument to his eye which magnifies the object and increases its proximity. If you speak of a contingent good, the telescope is instantly reversed; and he views it through the

opposite end, which diminishes its value, lessens its probability, and renders it only visible at the extreme point of a long perspective. In short, he is timid, desponding, infirm of purpose, imaginative, and incapable of continued application.

Such a man may be a poet, but not a mathematician.

On the contrary, when contractility is vigorous, and the circulation consequently energetic, the brain will be abundantly supplied with healthy blood; its nervous tissue firmly supported everywhere within the meshes of that tissue formed by the interlacings of well-filled blood-vessels; and its sensibility, therefore, will be, in a corresponding degree, obtuse. It requires a strong moral cause to operate on the mind of such a man. "Trifles light as air" have no power to excite, to irritate, or in any way affect him: he is, consequently, bold, patient, good-humoured, inflexible, unimaginative, and capable of long-continued mental exertion.\*

Such a man may become a great mathematician, but never a poet.

I think I could show that all the peculiarities of the human mind are to be accounted for, as depending upon certain modifications of the two physical properties—contractility and sensibility; but on this subject I have said enough—and, perhaps, you will add, "and to spare:" therefore, my dear John, for the present, I bid you farewell. "*Pax vobiscum?*"

E. JOHNSON.

\* Why does exercising the memory strengthen the memory? Clearly, because it strengthens the brain by increasing the vigour of the circulation through it. The use of the hammer strengthens the blacksmith's arm in the same manner; viz. by increasing the vigour of the circulation through it; and consequently increasing also its contractility, that is, its strength.

## LETTER V.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

I HAVE now to speak of the principal actions concerned in the nutrition of our bodies—that is, in converting our food into ourselves. These are four in number: *absorption, circulation, respiration, and secretion.*

If you have read attentively what I have already written concerning the absorbent vessels, and concerning those arteries which perform the office of secreting the several juices of the body, as the saliva, &c. ;—if, I say, you have read all this with attention, you will now have no difficulty in understanding what is meant by the terms absorption and secretion. I shall now, therefore, briefly describe the circulation of the blood, and the effect which respiration has upon it: and then I shall endeavour to exhibit to you these important phænomena of absorption, circulation, respiration, and secretion, in active operation, by tracing a given portion of food through all the changes wrought upon it, by virtue of these four actions, until it has become assimilated to the body.



First, let us trace the *circulation of the blood*.

The blood, of a bright vermilion hue, and richly laden with the elements of living matter—the new materials for repairing the wasted body—starting from the left side of the heart, enters the aorta. From the aorta it is distributed into branches of the aorta, and hence into branches of these branches, being divided and subdivided into smaller and smaller streamlets, as it proceeds from branch to branch. In this manner it is propelled onwards, until it has been subdivided into as many minute hairlike streamlets as there are points in the body ; there being no point of the body which is not supplied and nourished by one of these minute streamlets of blood.

While these countless myriads of currents are thus traversing the body—each, as it were, intent on reaching some one particular point or other as the end of its journey—they may be appropriately likened to an innumerable swarm of bees ; each laden with stores, and hastening onwards in order to deposit its own particular share at some point or other of the honey-comb, which they are all mutually engaged in building or repairing.

When the blood has thus arrived at every point of the entire body, and each streamlet has fulfilled its office of renovation, by parting with the new materials which it contained, and depositing them in the place of the old and worn-out materials which have been removed, but the instant before, by absorption—when, in a word, the function of nutrition has been performed, the little hairlike arteries, which brought these several minute streamlets of blood from the heart to the several points of their destination, bend back upon themselves, lose the structure peculiar to arteries, assume that

peculiar to veins, and commence their journey back to the heart.

The little streamlets of blood which fill these little backward-running veins having now parted with those living elements—those fresh materials—which they brought for the renovation of the body, may be likened, not inaptly, to the same swarm of bees mentioned before ; which, having deposited their precious burdens in various parts of the honey-comb, are now hastening back for a fresh supply.

The blood, therefore, having fulfilled its functions, quits the arteries, and enters the veins.

I have said, that when the arteries cease to be arteries, and become veins, they bend back upon themselves. The veins, therefore, in their passage towards the heart, run alongside the arteries, and parallel with them ; and wherever you find an artery bringing arterial blood from the heart, you will also find, by the side of it, and generally enclosed in the same sheath with it, a vein carrying back venous blood to the heart. Thus the several streams of venous and arterial blood pass each other on the road, as it were, like two trains of carriages moving side by side, but in contrary directions—the one train going out, the other returning home.

As the terminations of arteries form the beginnings of veins, it follows that the number of the veins, at their commencement, is equal to the number of the arteries. But these numerous minute veins, as they travel towards the heart, are every now and then uniting, to form larger ones ; consequently, the streams of venous blood, as they approach the heart, are constantly becoming larger and larger also ; and thus the

whole quantity of venous blood is eventually collected into two large veins, which empty themselves into the right cavity of the heart, like two Fleet ditches emptying themselves into the Thames.

We have now completed what is called "the great circle of circulation;" that is, we have traced the vermilion nutritious blood from the heart to every point of the body. We have seen it there part with its nutritious particles, in order to repair the waste of the body; and thus, deteriorated in quality, altered in colour, and rendered oppressive and unwholesome in its properties, we have traced it back to the same organ from which it set out, viz. the heart. But, although we have brought it back to the same organ from which it started, we have not yet brought it back to the same side of that organ. It set out from the left side of the heart; and we have only traced it back to the right. Let us therefore proceed.

When the black deteriorated blood has been brought back from every part of our structure, and collected into the two large veins, which I have denominated "Fleet ditches," and has been poured by them into the right cavity of the heart, the walls of that cavity contract upon it, and propel it into a large vessel, termed the pulmonary artery, by which it is conveyed to the lungs. In the lungs, the pulmonary artery is divided and subdivided into an infinite number of minute branches, which traverse every part of the lungs. The black blood, therefore, carried to the lungs by the pulmonary artery, is divided into numberless minute streamlets, which are conducted, in every direction, through the lungs, by the innumerable hairlike branches of this artery.

The lungs are made up of a countless number of

small cells, through and among which the little streamlets of black blood are of course conveyed: and every time we draw in our breath, these cells become filled with air; and the air which they then contain comes in contact with the little vessels containing black blood; and acting through the delicate coats of these, it operates those changes in the blood which it was sent to the lungs for the purpose of undergoing.

What the whole of these changes are, is not thoroughly understood: but this much is certain—that, whereas the blood enters the lungs of a black colour, and in a condition unfit to effect the nutrition of the body, it no sooner becomes exposed to the influence of the air in the cells of the lungs, than it loses its black colour, acquires the brilliant hue of vermillion, and becomes at once endowed with all the properties necessary to the nutrition of the body, and to the production or secretion of the several juices, such as, the gastric, the pancreatic, &c.

The black blood, then, having been exposed, in the air-cells of the lungs, to the action of the air, and having been by it purified, reimpregnated with nutritious particles, and every way requalified to fulfil its appointed offices in the body, is collected into four veins, called the “pulmonary veins;” by which it is brought back to the left side of the heart, from which it first started. And thus the lesser circle of circulation has been accomplished, and the whole circulation of the blood completed.

Allow me to recur, for a moment, to the metaphor of the bees. I like it:—it is a little fanciful, perhaps, but nevertheless appropriate, and not inclegant.

Consider the lungs, then, as a bed of sweet flowers,

upon which a swarm of bees (the little black streamlets of blood) have settled. These bees, having laden their thighs with honey, quit the flowers, and, taking their flight through the garden-gate (the heart), pursue their way, by various routes, (the arteries), in order to deposit their little burdens, and distribute them equally throughout the honey-comb; that is, the body. Having done this, they take wing once more; and returning in the same direction, but by different routes (the veins), they re-enter the garden-gate (the heart), and again settle themselves down upon the flower-bed (the lungs), in order to collect a fresh supply of honey; that is, of nutritive property. Observe: a stream of arterial blood is a bee laden with honey;—a stream of venous blood, a bee despoiled of its honey.

Now if, as I hope, you have understood my former Letters, you will recollect that the old body is constantly being dissolved, and carried away, and emptied into the venous blood; and that the new materials afforded by new food are also emptied into the venous blood at the same place (viz. just before it enters the right side of the heart, on its way to the lungs), by the lacteal absorbents. The black blood, therefore, when it reaches the lungs, has, mixed up with it, a portion of the old body in a fluid state, called “lymph,” and also a certain quantity of fresh nutriment, also in a fluid state, called “chyle.” But the fresh nutriment (that is, the chyle) has not yet become blood: it is merely mechanically commingled with the blood. The effect, therefore, which the air exerts on the blood in the lungs, is not merely to revivify old blood, but likewise to convert the chyle into blood. This conversion of chyle into blood is called “*sanguinification*.”



There is another important office fulfilled by respiration; viz. the expulsion from the body of such portions of the lymph as are no longer fit to remain in it, in the shape of that watery vapour which we denominate "breath." The mouth, therefore, is a portal, through which you receive the materials for a new body, and also through which you blow away the worn-out materials of the old. Every time you breathe, you blow away a little bit of your nose, a little bit of your ears, a fragment of your eyes, a particle of your brain, an atom of your heart: in short, a part of your whole person. If you chance to be walking in the fields, a portion, mounting through the air, assists in forming the clouds; and again, descending in showers of rain, contributes its share towards the formation of the multitudinous ocean. Another portion falls upon the green herbage of the meadow, and constitutes a part of the nourishment upon which that herbage subsists. Thus, not only "all flesh is grass," but grass, also, is flesh.

I shall now endeavour to exhibit the principal actions concerned in the nutrition of the body, by tracing a portion of food through all the necessary changes, until it has ceased to be food, and has become an integral part of yourself.

Let us suppose you to be in the act of despatching a hearty meal, consisting of animal food and various kinds of vegetables. You first introduce it into your mouth—with your teeth you masticate it—by means of your tongue, you roll it about your mouth. This rolling about brings it in contact with the several excretory ducts of the salivary glands; which open on the internal surface of the mouth, as we have before seen. These ducts, by virtue of their sensibility, become aware

of the presence of a stimulus (the food). The stimulation which the food in the mouth exerts upon the ducts is propagated along them to the glands out of which they issue, and which glands are thus excited to an increased secretion of saliva. And this increased secretion of saliva is the first of that series of actions by which the nutrition of the body is effected;—and in this, the very first stage, you see exemplified those three important properties of which I have said so much in my last two Letters—*stimulation*, *sensibility*, and *contractility*: for it is by virtue of their contractility that the arteries supplying the salivary glands with blood are capable of acting; that is, of contracting—and so of supplying the gland with blood, from which blood the saliva is to be secreted. It is by virtue of the stimulating property of the food that their contractility is roused into action; and it is by virtue of their sensibility that they are aware that a stimulus is acting upon them.

The nutritious bolus, then, having been thoroughly masticated and rolled about the mouth until it has been well mixed up with saliva, is, by a very complicated movement, mounted upon the back of the tongue, and by it jerked into the throat, by which it is propelled downward into the stomach. Its presence in the stomach stimulates that organ, as it stimulated the glands of the mouth; and a copious secretion of gastric juice (that is, stomach juice) is brought about in the same way as a copious secretion of saliva was effected by its presence in the mouth. But, as there are neither teeth nor tongue in the stomach, the food, when there, cannot be so readily and at once mixed up and kneaded, as it were, with the gastric juice, as it was by

means of those instruments, comminuted and commingled with the saliva in the mouth : it is not, therefore, subjected all at once to the action of the gastric juice, but gradually, layer after layer. While the nutritious bolus is circumvolving within the cavity of the stomach, the gastric juice, poured out from the sides of the stomach, above and around it, falls upon its surface. When its upper surface or layer has been sufficiently acted upon by the gastric juice—when, by virtue of the inherent properties of this juice, it has been converted into a semi-fluid peculiar to itself, and called “chyme”—it floats off and away from the rest, towards the lower part of the stomach, where it (the stomach) is united to the upper extremity of the bowels. The upper layer of the alimentary mass having been thus converted into chyme by the action of the gastric juice, and sent away from the remainder, the next layer becomes exposed to the action of this juice ;—and having, like the first, become converted into chyme, floats away after it to the pylorus, that is, the lower extremity of the stomach. Thus, layer after layer, the whole mass eventually becomes changed from the nature of food into chyme ;—gastric juice, during the whole time this change is going on, being poured out from the internal surface of the stomach upon fresh surfaces of the alimentary mass. The whole quantity is usually converted into chyme in about four hours.

Now mark ! whatever has been the nature and kind of the food which you have eaten, however heterogeneous the several viands may be, they must all be reduced to this unique homogeneous semi-fluid, called chyme—they must all lose their own several natures, and take upon themselves the one sole nature of chyme,

and so become chyme itself—before they can leave the stomach, and enter the bowels, in order there to undergo the next necessary change.

Now, if you have eaten any matters at your meal which are what is called “difficult of digestion,” that is, which are not easily assimilated to the nature of chyme by the action of the gastric juice; when these matters become exposed to the action of the gastric juice, they will necessarily require to be exposed for a longer time than is natural, because of the difficulty which the gastric juice experiences in reducing them to chyme. It will be, therefore, a longer time before these float off from the surface of the alimentary mass, so as to leave the next layer exposed to the action of the gastric juice; and the under layers or portions of food, which are waiting for their turn to be exposed, will be kept so waiting longer than the wonted space of time. The consequence of this is, that they are kept waiting, untouched by the gastric fluid, until they begin to undergo those changes common to all vegetable and animal matter, when placed in a warm, moist, and confined situation; viz. fermentation;—the vegetable matter undergoing the acid fermentation; and the animal, the putrefactive. For it must be remembered, that the food in the stomach still continues to be food, still remains unaltered, still continues, therefore, to be obedient to the common laws of fermentation and putrefaction, until it has its nature and identity destroyed, and a new nature and identity bestowed upon it by virtue of the action which the gastric juice exerts upon it. It ferments and putrefies, therefore, in the stomach (if not acted upon by the gastric juice) as quickly as it would do, on a sultry summer’s day, in a small pantry,

with its windows and door kept shut. And this shows you the reason why such matters as undergo putrefaction with the greatest rapidity, as some fish, and fresh pork, do not well agree with weak stomachs; for that which putrefies most rapidly in the pantry will do so in the stomach.

While, therefore, the indigestible matters are slowly submitting to the action of the gastric juice, the good and wholesome portion of the food is actually putrefying, and can, therefore, afford no nutriment. During the process of fermentation and putrefaction, moreover, as all the world knows, a number of fetid gases are given out: these poisonous gases distend the stomach, weaken its energies, oppress its sensibility, enfeeble its contractility, diminish the secretion of gastric juice, and, in a word, disturb, interrupt, and wholly overturn the whole process of assimilation in the stomach; and there is tumbled into the bowels—instead of a bland, smooth, homogeneous, healthy chyme—a filthy, fermenting, yeasty mass, smoking with offensive gases, and consisting of little else than sour vegetables and putrid meat: for the sensibility of the pyloric valve—of which I am to speak directly—is overcome by the oppressive influence and expansive nature of the gases which are distending the stomach. Is it possible, I ask, that healthy chyle and sound blood can be formed out of such a villainous compound of nastiness as this? But I have here described an extreme case.

As soon as this vile compound reaches the bowels, it will generally be expelled by them with violence: and this is the way in which bowel complaints are so often produced by some sorts of fish, and fresh pork, when eaten by persons whose stomachs are too weak to



furnish a sufficient quantity of gastric juice to reduce them to chyme before they have had time to run into putrefaction; and the wind which such persons discharge by the mouth, after eating, consists of the offensive gases above mentioned. Strong, healthy stomachs pour out their gastric juice so rapidly and abundantly, that the whole meal is reduced to chyme before the process of putrefaction has had time to begin.—Now let us proceed.

The food, having been properly acted upon by the gastric juice of the stomach, is now no longer food, but a bland, smooth, homogeneous semifluid, called chyme; which, quitting the upper part of the stomach, flows downward to the lower extremity—that part where the stomach is joined to the bowels. This junction of the lower extremity of the stomach with the upper extremity of the bowels is called “the pylorus:” and the pylorus is furnished with a peculiar valve, which accurately closes the communication between the stomach and bowels at all times, excepting when chyme is in the act of passing out of the stomach into the bowels. This valve is endowed with a singular and most beautiful kind of elective sensibility; which enables it to know, by the feel, whether the matters which come in contact with it be pure chyme or not; and nothing can enter the bowels from the stomach without coming in contact with it.

Now, let us suppose that a portion of food has been reduced to chyme, has flowed down to the lower extremity of the stomach, and has presented itself at the pyloric valve for admission through it into the bowels; and let us suppose that there is, floating on the chyme, a portion of food which has not yet been sufficiently

acted upon by the gastric juice. I will tell you what happens. As soon as the pyloric valve feels the presence of the smooth and bland chyme, it instantly opens, and allows it to pass; but no sooner does the portion of food which has not yet been reduced to chyme attempt to follow, than the valve instantly closes the aperture, and refuses it admission. This particle of food must, therefore, return to the upper part of the stomach, to be again submitted to the agency of the gastric juice, before it can be permitted to escape from the stomach into the bowels. Is not this a beautiful exemplification of the importance of the sensibility of our organs?—and said I not truly, when I called it “our guardian angel?” For what is the sensibility of the pyloric valve, by which it is enabled to distinguish between perfect and imperfect chyme?—what is it, I say, but a watchman, a sentinel, posted at the entrance into the bowels, in order to watch over their safety; to see that nothing be allowed to enter which is likely to disturb or irritate them; to take care that nothing injurious, nothing offensive, nothing which may be in any way hostile to their safety, nothing, in fact, which has no business there, be permitted to trespass within the sacred precincts of organs so important to the health and welfare of the whole being, of which they form so vital a part?

That imperfectly chymified food cannot enter the bowels without injury to them is sufficiently proved by the very existence of this valve. For surely it is foolish to suppose that nature, who does nothing in vain, would have been at the pains of establishing so beautiful, so wonderful a contrivance, if the office which it fulfils were not in the last degree essential!

What mischief, therefore, do those persons inflict upon themselves—what a wide door for the admission of all sorts of evils do those persons throw open—who, perpetually stimulating the pyloric valve by the unnatural stimuli of ardent spirit and highly-seasoned sauces, enfeeble, wear out, and eventually destroy its sensibility: so that whatever the caprice of the palate throws into the stomach, is tumbled, right or wrong, assimilated or unassimilated, good, bad, and indifferent, altogether, without let or hindrance, into the bowels! for the sentry-box is deserted—the watchman is dead.

When I contemplate this state of things, I think I see a whole army of diseases marching in file out of the stomach, through the pyloric gateway, into the citadel of the bowels. I see pale-faced and bloated Dropsy with his swollen legs—livid Asthma struggling for breath—grotesque and tottering Palsy—yellow-visaged Jaundice—red-eyed Delirium—Fever, with his baked lips and parched tongue, looking piteously around, and crying, “Water! water!”—limping Gout, grinning with pain—musing Melancholy—hideous Insanity!—But let us drop the curtain over a picture so horrible. My mind’s eye aches with looking at it. Above all things, my dear John, take care of your pyloric valve!

Now let us get on a step further.

The food having been thoroughly and properly acted upon by the gastric juice in the stomach, is reduced to a uniform substance, called “chyme;” and this is the first great change in that succession of changes which is ultimately to convert it into blood. There is now neither bread nor meat in your stomach—there is nothing there but chyme; which is neither meat nor bread; but a

fluid, the nature of which is one degree nearer to the nature of blood than it was before it became chyme.

The chyme then flows to the lower extremity of the stomach; presents itself at the pyloric valve; and, having been examined, as it were, by the sensibility of that valve, and reported "all right," is admitted into the duodenum.

The first twelve inches of the bowels, reckoning from their junction with the stomach downward, are called the duodenum.

Now, the chyme in the duodenum has precisely the same effect upon the excretory ducts of the liver and pancreas, which open into the duodenum, as the food had, in the mouth, upon the excretory ducts of the salivary glands; that is to say, it stimulates the mouths of these excretory ducts; and this stimulation is propagated along the ducts to the glands themselves—the liver and pancreas. These glands, so stimulated, pour out an increased quantity of their individual secretions; viz. bile and pancreatic juice. The surface of the bowel itself, too, (the duodenum), pours out an increased quantity of fluid, called "the intestinal juice." The chyme mingling with these juices, another remarkable change is effected: the chyme is no longer chyme; it has lost its identity; and the result is, two fluids, of which one is called chyle.

This conversion of the chyme into chyle, and another fluid,\* forms the second great change, by which that which was once food, (bread and meat,) has been advanced two degrees more nearly to the nature of blood.

I hope you have not yet forgotten that the chylous

\* This *other* fluid is also absorbed into the blood by the veins.

absorbents arise, by open mouths, from the internal surface of the bowels. As the chyle, therefore, flows along the duodenum, it comes into contact with the open mouths of the chylous absorbents. These, by virtue of their sensibility, become aware of the presence of the chyle, which is stimulating them to action. They answer the call, by erecting themselves, protruding themselves forward, dipping, as it were, their mouths into the chyle, and then retracting and closing them, thus performing an actual suction (if you will allow the term), by which the chyle is drawn within the calibre of these beautiful little vessels.

The chyle, thus absorbed, travels along the lacteals (that is, the chylous absorbents); is filtrated through their glands; is emptied into the thoracic duct; and by it, is poured into the blood of the veins about the bottom of the neck, and is carried by the current of the blood through the right side of the heart, along the pulmonary artery into the lungs.

While the chyle is traversing the chylous absorbents and their glands, it undergoes a change, the nature of which is not understood; but it is a change which advances it another degree nearer to the nature of blood. By the time, therefore, that your dinner—or, rather, that which was once the food which constituted your dinner—has reached your lungs, it has become almost blood; but it has not yet become quite blood.

When the chyle has reached the lungs, it is then exposed to the action of the air which we inhale, in the manner which I described when speaking of the circulation of the blood. Here the final change is effected; and that which was bread and meat has now entirely lost all its former characteristics. It was first food,



then chyme, then chyle. Now it is none of these : it has acquired, by virtue of the agency of the air in the lungs, the colour and all the other qualities and properties of blood : in a word, it has become blood itself. Thus, comparing the animal economy to the economy of vegetable life, one might say, that the stomach and bowels are the soil ; bread and meat are the seed which is sown therein ; and blood is the fruit which that seed produces—a fruit which is destined to become the food of the animal. For, as was justly said by Hippocrates, “ there is but one food, although there are several forms of food.” However various the viands may be which we put into the stomach, they must all be converted into one and the same fluid, viz. blood, before they can have any effect whatever in nourishing or strengthening the body. Blood, then, is the sole nourishment on which we subsist ; what we eat being no more than so much seed sown, with the view of producing a nutritious fruit, by which the body is to be fed, and its health and strength sustained ;—viz. blood. We are no more nourished or fed by what we eat, than sheep are nourished by the turnip-seed which the farmer sows. The turnip-seed soon loses its identity ; but in doing so, it gives rise to a turnip ; and it is upon this turnip that the sheep feeds, and not upon the seed which produced it. And, in like manner, what we eat loses, like the seed, its nature and identity ; but in doing so, it produces blood ; and it is by this blood that our bodies are fed, nourished, and sustained. For, as the turnip is not the seed, but the product of the seed, so neither is the blood bread and meat, but the product of bread and meat ; and it is from this new product that we derive our strength ; and it is this

which constitutes our food. Hence becomes manifest the utter impossibility of deriving any manner of nourishment or strength from substances which are incapable of being converted into blood; for example, ardent spirit;—no mechanism, no chemistry, no power, no magic, is capable of converting brandy into blood.

Hitherto, then, we have only seen the seed sown, and the proper fruit produced. We have now to mark the manner by which the body is fed and nourished by this fruit, viz. the blood. By the way, I may as well take this opportunity of calling upon you to take notice how little the quantity which we eat has to do with the quantity of nourishment which we derive from it; for, as the stomach, liver, &c. can only furnish at one time, enough of their several juices to convert a certain portion of what we eat into chyme and chyle, it is manifest, that only a certain portion can be converted into blood. And as blood is the sole aliment from which we can derive sustentation, it is equally manifest that we cannot derive any benefit from what we eat, except from that portion of it which in due course becomes blood. All that we eat, therefore, beyond what can be converted into blood, is either changed into that useless encumbrance called fat, or is left in the stomach and bowels to run into fermentation; serving no other purpose than to distend these organs with all sorts of pernicious and offensive gases.

In order to exhibit the manner in which the body is nourished—that is, the manner in which the fluid blood is converted into the solid parts of the body—it will, I think, be better to trace, to this consummation, only a single drop of blood at a time. You will, by

this method, more readily understand it. But, by a drop I do not mean a great, round, pumpkin of a thing, like a rain-drop, or a dew-drop ; but a delicate minute globule, visible only to the eye of imagination—like the glow-worm's tear of disappointed love, when she lighteth her lamp in vain.

You have just seen the fresh chyle taken up by the chylous absorbents, and emptied, by the thoracic duct, into the veins at the bottom of the neck. Let us follow a single globule of this chyle.

Hurried along by the current of blood in these veins, it passes through the right side of the heart, along the pulmonary artery ; then through one of its branches, into the substance of the lungs. Here it is acted upon by the air in the cells of the lungs, loses its characteristics of chyle, and becomes blood. It now turns round, as it were, and hurries back again out of the lungs along the pulmonary veins, to the left cavity of the heart.

But before we trace its progress any further, let us suppose that a hungry absorbent has just carried off a single particle from the point—the extreme protuberant tip of your organ of smell—"the very topmost, towering height o' Johnny's nose." The carrying off this particle would necessarily leave a little hole. Now let us go back for our little globule of blood, which we have just traced from the lungs to the left cavity of the heart.

Rejoicing in its new existence, it leaps out of the heart into the aorta, hence into the carotid artery, thence into the external carotid, thence into the facial, thence into the superior coronary, and thence into a minute branch which the superior coronary gives off ;

which branch takes its course toward the tip of your nose.

By the time the artery, along which the little globule of blood is travelling, has nearly reached the tip of your nose (worthy to be called proboscis,) it has become exceedingly minute, and its course tortuous; for it is now forming part of the ultimate tissue of the tip of the nasal promontory. The little globule, therefore, now moves along with diminished rapidity. Gradually it approaches nearer and nearer; and just when it has arrived exactly opposite to the little hollow left by the absorbent, becoming suddenly obedient to the secret agency of the nerves, its nutritious elements dart through the coats of the artery, like rays of light through glass, into that hollow, and at that instant become part and parcel of one of the most goodly noses within the four seas. The artery now turns back, soon loses the characteristics of an artery, and becomes a vein; by which vein the rest of the little globule is conveyed back, through the heart, to the lungs, there to be mingled with fresh chyle, and revived by the action of the air in their cells.

This transformation of the fluid blood into the solid body is called solidification.

Now this is the way in which all the solid parts of your body are formed and maintained; every inch of it, therefore, once floated in your arteries, in the shape and quality of blood: and you see how foolish it is to suppose that there can be any real nutriment in those strong drinks to which the multitude attribute so many nourishing properties. What an inscrutably mysterious power, too, is manifested in this process! How wonderful, that so common and simple an affair as a potato

should contain within itself all the elements necessary to the composition of an eye, an ear, or a tooth!—that this unheeded and unvalued root should be capable, within a few hours, of being changed, by commixture with the juices of the body, and by exposure to common air in the lungs, into blood!—and that from this single fluid, made out of this single potato, should be produced all those diversified and heterogencous matters which make up the total of the body—the brittle bones, the soft and pulpy brain, the hard and horny nails, the silky hair, the flesh, the fat, the skin, the bitter bile, the sweet milk, the salt perspiration—everything, in fact, from the corn on my lord's toe, to the down on my lady's cheek—from the sweat on the brow of Labour, to the dew on the lip of Beauty! Does it not seem incredible, that the ear, which can take cognizance of the faintest pulsations in the air, and appreciate with so much accuracy the value of musical tones—that the eye, wherewith the astronomer numbers the stars, taking in, at a glance, the half of heaven's whole orrery—nay, that the very brain, wherewith he thinks, and muses, and ponders over his problems and his logarithms and his equations—that the very brain itself of a Newton and a Shakspeare should own no better or nobler source than that of a despised potato! And, then, to think that that brain must die—must rot, and be resolved into its parent earth? Yet this is but the simple truth; and thus, like Ixion's, revolves for ever the wheel of all existence—round, and round, and round—in an eternal circle of successive changes.

I shall now take leave to call your attention to certain facts which necessarily result from what I have said; and of which I wish you to take especial note.



First, then, you will observe, in following the food from the mouth, through all its intermediate changes until it has become blood, that almost all those intermediate changes are wrought upon it by the agency of the several fluids, juices, or secretions which it meets with in the mouth, stomach, and bowels; and that, consequently, its due conversion into healthy blood depends upon the healthy quality and abundant quantity of these secretions. But these secretions, like everything else in the body, are formed out of the blood; and their quality and quantity will, consequently, depend upon the quantity of vermilion blood wherewith the organs in which they are produced are supplied. And the quantity of blood with which these organs are furnished must depend upon the vigour and activity of the heart and arteries, whose office it is to convey it. Thus, then, it becomes clearly manifest, that a vigorous circulation is absolutely necessary to the assimilation (vulgarly called digestion) of our food. Whatever causes and habits of life, therefore, are calculated to give strength and activity to the circulation—as, for instance, exercise—is clearly of the first importance to the nutrition, and, therefore, to the health and strength of the body; and whatever causes and habits have a tendency to depress the energy of the circulation—to allow the blood to creep languidly through the body, instead of dancing along its channels cheerily and energetically—as, for instance, cushioned laziness, which rides when it should walk—must, of necessity, have the direct effect of impairing assimilation, and therefore of enfeebling the strength and sapping the very foundations of health.

But the energy of the circulation must exclusively

depend upon the energy of the heart and arteries: and the energy of these, as has been already shown, depends necessarily upon the energy of their contractility; and energetic contractility depends on an energetic circulation, and is incompatible with a high degree of sensibility. Hence it directly follows, that whatever causes are calculated to increase sensibility—to make us tender, if you will tolerate a vulgar expression—have an immediate and powerful effect in impeding the conversion of our food into blood, and, therefore, of impairing the process of nutrition. Hence arise the incalculable mischiefs of a daily indulgence in what are misnamed the comforts of life; but which are, in reality, most pernicious and unnatural luxuries. A few of these are, table-indulgences, lounging on couches, warm carpeted rooms, window-curtains, bed-curtains, blazing fires, soft beds, flannel under-clothes (I speak of the healthy, not of the sickly invalid), novel reading, hot suppers, and, though last, by no means least, that precious piece of foolery, called passive exercise—that is, lolling along at ease in a stuffed and cushioned carriage. Not that I would totally abolish any one of these, except, perhaps, hot suppers and soft beds; but that I wish, by proving to you their evil influences, to induce you to use them as sparingly as the conventional habits of society will permit: though I confess, for my own part, I see no reason why any man should feel himself called upon to injure his health—to blur the beauty of God's noblest work—solely to gratify the capricious whim of that many-headed monster, that blatant beast, called *society*.

Again, the brain itself is the product of the blood—it is as literally and truly made of blood, as the most

beautiful china vase is made of clay. Hence the qualities of the brain—the mental energies, as they are called—courage, the powers of abstract thinking, fortitude, patience, generosity, and, above all, good-humour,\* can only exist in conjunction with, and owe their very being to, a vigorous circulation. Hence it seems scarcely too much to say, that thought itself is produced from the blood; since there can be no energy of thought without energy of brain, and no energy of brain without energy of circulation through that brain.

THOUGHT is an act of the WILL. It is an act by which certain ideas are, to the exclusion of all others, summoned to present themselves to the mind's eye, that judgment may marshal them, compare them, and newly combine them. Thus, in solving a mathematical problem, the *will* suffers no ideas to intrude, save only the necessary ones of lines, angles, &c.

But the *will* is one of the energies of the brain; and we have just seen that these energies can only fully exist in conjunction with a vigorous circulation. When the circulation, therefore, is languid, the *will* will be languidly exerted—it will be unable either to command the presence of the ideas required, or to discard those whose presence is troublesome, and which only tend to perplex and interrupt the process of thought.

When a man with such a brain sits down to think, he finds that all sorts of ideas, wholly irrelative to the subject on which he wishes to think, are perpetually thrusting themselves into his mind “against the

\* If you go in search of good-humour, you must look to find it playing on the ruddy cheek and laughing in the unclouded eye of athletic strength. The sensibility of the athlete is too obtuse to be easily irritated. The skin of his mind is thick: and causes capable of excoriating others have only power to tickle the athlete.

stomach of his will;" and so excluding those which a feeble and irresolute *will* is vainly endeavouring to summon and retain. If he be reading a book, he will find, every now and then, that though his eye has been tracing the words and lines, and his hand has been mechanically turning over the leaves—he will find, I say, that his mind has been wandering far away, and knows no more of what he has just been reading than the man in the moon. In a word, he has no power of abstract thought—no power to fix his attention. This state of mind is called reverie.

Herein consists the difference between thought and imagination. Thought, as I said before, is an act of the *will*; and that act, to be efficient, requires a vigorous circulation. It is the office of the *will* to decide, as it were, as to what ideas shall be admitted into the brain, and what refused admittance. But imagination resembles a dream, in which the *will* is asleep; it is a condition of the brain, in which all sorts of heterogeneous ideas, in despite of the *will*, come and go, in tumultuous disorder, without let or hindrance, as in a dream. In this state of the brain, the contractility of its arterial tissue is feeble, and therefore the circulation through it is feeble; and therefore the *will*, which I have shown to depend on a strong circulation, is also feeble. In this state, the brain may be likened to an ideal theatre, without either cheek-takers or money-takers, and with all its doors thrown open, at which doors a multitudinous throng of ideas, of all colours and costumes, collected from all the corners of the earth and every domain of nature, are perpetually making their "exits and their entrances." And as the little pieces of coloured glass in a kaleidoscope will often arrange

themselves into figures more beautiful than any art can imitate, so, on the stage of this imaginary theatre, parties of these ideas will frequently frolic and gambol themselves into groups more grotesque, more picturesque beautiful, than any effort of thought and judgment can accomplish.

Energy of will, therefore—firmness of purpose—the power of abstract thinking and reasoning—are all incompatible with a lively imagination; because the three former require an energetic circulation, while the last depends on a circulation of a contrary character.

There can be little doubt, I think, that insanity has its cause in some injury to the vigour of the circulation through some part of the brain.

That the doubts and fears and anxieties of the lover have a depressing effect on the circulation, is a fact long since established. The pensive dreamy sadness, the absent mind, the fondness for solitude, the long-drawn impassioned sigh so characteristic of love, is equally characteristic of a languid circulation.

The same condition exists in the poet; and the mental characters of all three will be found to possess no small similarity. So great indeed is this resemblance, that those who begin by being poets or lovers, not unfrequently end by becoming madmen. They are all three (generally) weak, wavering, wayward beings, incapable of abstracting their minds at pleasure, unable to control their thoughts;—and it may almost be said of all three alike, that they have scarcely any will or purpose of their own. Hence

“The lunatic, the lover, and the poet,  
Are of imagination all compact;”

and hence it is true, that the poet does not sit down to



think what he shall write, but to write what he thinks. But the word "think," in the last instance, is improperly used; he sits down in order to describe the ideas which his mind's eye beholds dancing in antic and ever-varying groups on the stage of his own brain's theatre—to

———"body forth  
The forms of things unknown;  
Turn them to shapes; and give to airy nothings  
A local habitation and a name."

Hence, too, every true lover is a poet, and every true poet a lover.

Finally, my dear John, you will observe that everything connected with life—all the actions, the energies, and beauties of the body—all the actions, energies, and beauties of the mind, as well as the body and mind themselves, are under the dominion of the circulation of the blood, from which both mind and body must inevitably derive each its tone and character. So that "the body and the mind are like a jerkin and a jerkin's lining;—rumple the one, and you rumple the other."

I have now described to you as much of the structure of the body, and its functions, as I conceive to be necessary, in order to enable you to understand what I have presently to say on the subject of diet and regimen. And you must now know quite enough to be heartily convinced of the unmitigated folly of those persons, who, without knowing anything of the structure of living parts, or of their actions, or of those delicate springs, contractility and sensibility, which originate and sustain those actions—who, I say, being as ignorant as idiotism of all that concerns the nature of life and

living things, are nevertheless perpetually tinkering their stomachs with quack remedies;—thus stupidly presuming to mend a machine, of the very nature and structure and actions of which they are as uninformed as infant Hottentots.

The health of the body depends upon the healthy performance of the nutritive actions; and disease consists in the unhealthy performance of these actions, or of one or more of them. Medicines, therefore, with very few exceptions, such as those which seem to cure by chemically combining with and neutralizing the poison in the system which produced the disorder—medicines, with these few exceptions, have no power over disease, excepting as they have the power of increasing or diminishing the activity of the nutritive actions—absorption, secretion, circulation, &c.

When a man examines his patient, the question with him is not, Has he got a fever; or this, that, or the other disease? The question is, Which of the living actions is going wrong? and how is it going wrong? Is it going too fast or too slow? The patient has, perhaps, a foul tongue, dry skin, a quick pulse. But these are not the disease: these are the symptoms—the outward signs of the disorder within. He has nothing to do with these except as signs by which he ascertains the cause producing them. The question, therefore, is not what is good for a foul tongue, a hot skin, and a quick pulse; but what medicine possesses the power of controlling that particular living action—a disturbance in which has produced, in this particular instance, the symptoms in question. I say, in this particular instance; because, in others, the same symptoms will be produced by a disturbance in a different living

action. The same symptoms, therefore, frequently require different treatment; because the cause of those symptoms is different, although the symptoms themselves are the same. I will give you a familiar instance. One man has a foul tongue, a quick pulse, and a dry skin, produced by inflammation of one of the membranes of his brain: he therefore requires leeches to his head. Another man has the same symptoms, from inflammation of the mucous membrane of the bowels: he requires leeches too—not to the head, but to the abdomen! Again, if a medical man finds his patient in pain, he does not forthwith run home for a dose of opium, because opium has sometimes the power of relieving pain; but he first ascertains which of the vital actions, which, being disturbed, is producing that pain. If it arise from spasm, opium may be of service; but if it arise from inflammation, opium will do harm, instead of good. If it were only necessary to attend to symptoms, and not to the cause of those symptoms, then the proper remedy for a foul tongue would be a scraper. One man has a head-ache from inflammation of the brain; another from flatulence of the stomach:—brandy will kill the one, and cure the other.

Again: cough may be produced by tubercles in the lungs—by inflammation of their mucous membrane—by inflammation of their coverings—by inflammation of their parenchymatous substance—by disease of the heart—by disease of the liver—by an accumulation of water in the chest—of matter in the chest, &c. &c.

I will tell you what happens every day. One of the faculty of ninnies gets a cough; and meeting with another, he is assured that so, or so, or so, is a “fine thing for a cough.” The “fine thing for a cough” is

straightway procured. Shortly, he has occasion to call on his tailor; and his tailor incontinently recommends him another "fine thing." The following week, his tinker brings home a mended saucepan: and then the tinker's "fine thing" must have a trial also. Then comes the butcher, and the baker, each armed at all points with "the finest thing in the world for a cough."

But, somehow or other, the cough still goes on—"ugh, ugh, ugh," barking away as before. Having frittered away a month or two in these follies, he then does just what he should have done at first—he walks off to the doctor, who finds that the cough was produced by inflammation of the covering of the lungs, which the abstraction of a little blood and a blister would, at the onset, have removed at once; but that, now, coagulable lymph has been poured from the inflamed surface, the covering of the lungs is adhering to the lining of the chest, and the patient has contracted a deadly disease, which no art can remedy. The tinker and the tailor, when informed of this, lift up their hands and eyes, and cry, "Dear me! who could have thought it?" and then march away to their other customers; to whom, if they happen to have coughs too, they very composedly recommend "their fine things for a cough" over again.

Is it not perfectly astonishing, that a carpenter, or a bricklayer, who would never think of pretending to mend your shoes, should, nevertheless, have no hesitation whatever in offering his services to mend your health? If you carry your kettle to be mended to any one but a tinker, he will tell you honestly that he knows not how to do it. But you shall travel from Dan to Beersheba, and, should you meet a thousand pas-

sengers by the way, not a soul of them but will undertake, should you complain of being unwell, to cure you on the spot.

Now, all this folly and mischief is attributable to no less a personage than that respectable old lady, said to be the mother of Wisdom—I mean Experience. It happens thus :—Mr. Noaks gets a pain in his bowels—his neighbour Styles experienced a similar pain last week, took brandy, and got well. Relying on this experience, he recommends brandy to Noaks. Noaks takes a glass, and feels better—another glass, and feels better still—a third cures him. Next year, his son complains of a pain in his bowels; and his father, mindful of the experience of himself, and eke his neighbour Styles, administers to his son, in full confidence, a bumper of brandy. The son gets rather worse; but then his father recollects that the first glass did not cure his own pain, and so he gives his son another, and advises him to go to bed. Next morning, however, the pain being no better, some other neighbour assures the father that he has often experienced wonderful relief, whenever he has had a pain in the bowels, from gin and peppermint. So the father gives the son a bumper of gin and peppermint. But, although brandy, and gin and peppermint, might have cured the colic-pains of his two neighbours, it would not be found to be quite the thing for the inflammation which is already raging among his poor son's bowels. At last the doctor is called in, who finds that his patient has been labouring for thirty or forty hours under a disease which will often kill its victim in twenty-four; and that however mild it might have been at its onset, it has



now, by the aid of brandy and gin, been urged on to incurable violence.

Experience may be the mother of Wisdom, for aught I know ; but she is certainly the mother of Mischief also. Experience may teach a man to make bricks, and to lay bricks ; but, without the scientific knowledge necessary to inform him how to use her, she can never teach him the practice of physic. Money is of no use to a man, unless he knows how to lay it out : and experience is unprofitable, unless a man knows how to apply it. And as money may be laid out to the injury of the spender, so experience, misapplied, becomes a curse in the hands of its possessor. Farewell !

E. JOHNSON.

## LETTER VI.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

I HAVE now given you what I hope you have found to be a tolerably clear notion of the several actions concerned in nutrition—and of the nature of life and health.

I have now to point out to you what I believe to be the chief causes and sources of disease.

When a man, who thinks as well as sees, suffers his eye to range over the various minor systems which compose the one great scheme of the universe—when he looks at the planetary system, and beholds worlds whirling amid worlds in countless numbers, with inconceivable rapidity, yet infallible precision—when he dwells on the vegetable system, and sees myriads of plants rising from the same earth, living in the same air, warmed by the same sun, watered by the same rain, yet each differing from each, and affording year after year, for ever, each its own peculiar product, with unerring exactitude—the vine the grape, the oak the acorn, the briar the rose, the foxglove its bells of blue, the holly its berries of red ;—when, with more inquisitive

glance, he penetrates the thicker veil with which nature has curtained the chemical world, and watches the several phænomena resulting from chemical operations—combustion, putrefaction, vegetable fermentation, &c., and observes the unfailing exactitude with which all these render obedient homage to the one great law of affinity;—then, when he looks inward, and contemplates his own system—beautiful as the most beautiful, and not less worthy of Omnipotent Wisdom than the most worthy—when he looks inward, I say, and beholds there all confusion and imperfection—when he perceives that, of all the systems of nature, that of man alone is liable to derangement, and is the only one of all which ever fails of fulfilling its intentions—when he sees that while all others always go right, his own goes almost always wrong; when, moreover, he reflects that his own system is the work of the same Almighty hand which fashioned and gave being to all the others—when the eye remarks all this, the mind cannot but be irresistibly struck with the anomaly; and the tongue cannot but exclaim, “Why is this so? How is it that the system of man—of man, the master-miracle of creation—how comes it that the system of man is for ever going wrong, while all around him goes right? The natural average of human life, we are told on high authority, is “three-score years and ten.” How happens it, then, that “about one-fourth of the children that are born, die within the first eleven months of life; one-third within twenty-three months; and one-half before they reach their eighth year?—that two-thirds of mankind die before the thirty-ninth year, and three-fourths before the fifty-first?—so that, as Buffon observes, of nine children that are born, only one arrives at the age

of seventy-three ; of thirty, only one lives to the age of eighty ; while, out of two hundred and ninety-one, only one lives to the age of ninety ; and, in the last place, out of eleven thousand nine hundred and ninety-six, only one drags on a languid existence to the age of a hundred years. The mean term of life is, according to the same author, eight years in a new-born child. As the child grows older, his existence becomes more secure ; and after the first year, he may reasonably be expected to live to the age of thirty-three. Life becomes gradually firmer up to the age of seven ; when the child, after going through the danger of dentition, will probably live forty-two years and three months. After this period, the sum of probabilities, which had gradually increased, undergoes a progressive decrease ; so that a child of fourteen cannot expect to live beyond thirty-seven years and five months ; a man of thirty, twenty-eight years more ; and, in the last place, a man of eighty-four but one year more. Such is the result of observation, and of calculations on the different degrees of probability of human life, by Halley, Graunt, Kersboom, Wargentin, Simson, Deparcieux, Dupre de St. Maur, Buffon, D'Alembert, Barthez, Dupre, and M. Mourgues."—*De Lys' Richerand*.—How is it, that of the whole number of children, so few, so very few, live long enough to fulfil the final cause of human existence ?

Now if, in contemplating the system of man in connexion with the other systems of nature, we be able to discover any one very striking difference wherein his system differs from all others, may we not fairly presume that this difference between them is the cause of

the remarkable and otherwise unaccountable anomaly above mentioned ?

We need not look far, nor ponder long, in order to discover the difference which distinguishes the system of man from that of all others ;—and it is indeed a momentous one ! It is this : that while all the other systems of the universe are sustained and governed by immutable laws, as gravitation, chemical affinity, instinct, &c. &c., the system of man depends solely for support upon laws, the perfect or imperfect fulfilment of which has been left dependent on the capricious conduct of man himself. For the laws which sustain the human system are the laws of nutrition ; and these are for ever subject to disturbance by man's misconduct. For instance : a man may voluntarily half starve himself—or by his folly he may bring himself into a position in which he is unable to procure sufficient food—or he may take greatly too much—or he may select for food such substances as are incapable of being assimilated to his own structure—or he may annul the laws of nutrition entirely by taking aliment of a poisonous quality. Now, it is perfectly manifest, that under any of these circumstances the laws of nutrition must be seriously modified—injuriously disturbed. And it is equally clear, that these circumstances, in the instances supposed, are the result of human conduct. The system of the lower animals are also sustained by the same laws of nutrition ; and these laws are also liable to be modified by the conduct and habits of these animals : but, then, the conduct and habits of brutes are themselves dependent on instinct, which is unerring : whereas the conduct and habits of man depend on his



own caprice—the use or abuse of his reason, which is not unerring.

The grand distinction, therefore, between all the other systems of nature and that of man seems to be, that while the former are sustained by unerring laws, the latter is supported by laws which are subservient to the erring conduct of man, with relation to the manner of his nutrication\* and mode of existence.

Now, it is to this “erring conduct with relation to the manner of his nutrication and mode of existence,” that I look, as the cause and source of human disease.

To every system nature has allotted a determinate position: and she has established a fixed relation between each system, and all the other systems by which each is surrounded; and from their allotted position none can swerve—their own allotted relation to surrounding objects none can disturb—none, except man. But man, as I hope to prove to you hereafter, has removed himself from his natural position—has broken down his natural relation to the external world: and so brought himself within the sphere of the operation of causes injurious to his well-being, which could not otherwise have reached him.

All planetary phænomena, as we have just seen, as well as those of brute life, of chemistry, of vegetable life, mechanics, and physics in general, owe their infallibility to the infallibility of the laws which sustain them: and I think it cannot be doubted, that the fallibility which distinguishes the system of man from all others, has its origin in the fallibility of the laws on

\* Be careful not to confound the term “nutrication” with the term “nutrition.” Nutrication signifies the supplying the mouth with food; nutrition, the assimilation of that food to our own structure.

which it depends for support, or rather the fallibility of that conduct and mode of existence on which those laws depend for their perfect or imperfect fulfilment. If the immutable law of gravitation—which, as it were, bridles the planets, guiding and restraining each in its proper path—had depended for its energy and constancy upon the caprice of man, is it not easily conceivable—nay, is it not absolutely certain—that the system of the planets would have been liable to as many disorders as is the humano-animal system? Should we not speedily have had a repetition of those scenes, in which the North Pole glowed with summer heat—when the lazy Bootes ran sweating away with his wagon, and the Moon could not but express her astonishment on seeing her brother's curriole and four in the very act of trespassing on her own highway?—should we not have had hot fits and cold fits—fevers and agues—disordered functions and diminished secretions? Would not the Moon occasionally have forgotten her function of reflection, and the Sun his secretion of light?

By a parity of converse reasoning, had the system of man been made to rely for its sustentation on some immutable law—like that of gravitation—had the nutrition of the body been effected by some invariable law over which man possessed no control—had he himself nothing to do with the feeding his body, and had he possessed no power to alter his allotted position and relation in the universe—in a word, were we fed by chemical affinity, and held in our places by some physical law—then the actions which constitute the life and the health of the human machine would have been as unerringly executed as the revolutions which constitute the health and the life of the planetary

scheme. A well-constructed watch, if properly defended from external injury, will indicate the hours of the day as infallibly as the Moon will revolve in her orbit in her given month: so also, under like circumstances, would those movements and revolutions of the fluids which constitute the life of the human machine be executed with the same unfailing precision, provided only that the law of nutrition be properly fulfilled, and its proper position among the other systems of the universe duly observed. All things were created with a view to the fulfilment of a final cause; and it is insulting to the Creator to suppose that He has attempted to attain to a final cause by means which are inefficient to its accomplishment.—But it may be denied that other systems are infallible. It may be said, that there are occasionally certain signs observable in the heavens which seem to indicate that then and there a world has gone to pieces. Be it so. But who shall say that it has gone to pieces before it has fulfilled its final cause—before it had existed its appointed term! I am not attempting to prove that man is not “born to die”—I am only endeavouring to show that he was not by nature subjected to disease and premature death. I claim for the system of man no more than is readily conceded to other systems. I claim for him only the same degree of perfection, the same importance, the same consistency, which are so clearly observable in all the other works of the Almighty Architect of the universe. I cannot believe that it formed a part of the original scheme, that one half of mankind should die before they have attained the age of eight years—that is, before they have lived long enough to fulfil any one

conceivable intention—in fact, before they are themselves fully formed.

If any man die while any one of his organs is unimpaired, he dies prematurely, and before he has fulfilled the final cause of his existence. For nature is an economist in everything: she creates nothing in vain: she never falls short, nor does she ever exceed the object in view: she husband her resources, and never wastes her energies. But to create an eye or an ear with the power of seeing or hearing for eighty years, and to attach that eye or that ear to a body capable of existing only sixty years, would be an obvious waste, a most unnecessary expenditure of energy. This would be like loading a blunderbuss to shoot a sparrow. What would you say to that architect who should employ fifty men for fifty days in erecting a column of stone to support a bird-eagle or a pepper-box? The means, my dear John, which nature employs, are always exactly proportioned to the end—not an atom too little, not an atom too much.

If this reasoning be not admitted, then we are driven to the conclusion, that the human system contains within itself, as part of its primitive design, and wholly independent of man's conduct, the principles of disease and premature death. But that *some* individuals do escape both these—both disease and premature death—the evidence of our senses daily assures us. In these individuals, therefore, either these principles do not exist, or they exist to no purpose. These principles, therefore, can only form a part of the primitive design of some individual systems; or, if they do form a part of the original scheme of all, they are clearly only effective in some. But, surely, to suppose this, is to

make such a haphazard affair of human life—is to convert this “ harp of a thousand strings ” into such an ill-contrived and discordant kettle-drum—is to reduce it to a thing of such mere contingency, that no one but the infidel proselyte to the doctrines of blind chance could reconcile it either to his reason or his conscience to believe it.

But that disease and premature death formed no part of the original design of man, is superabundantly proved by the innumerable contrivances which nature has instituted, in every part of the machine, to repel them ; and the mighty efforts which she makes, under disease, to escape them.

My inference, then, is this ; that the vital actions constitute a system of nature, which is, like her other systems, perfect in itself ;—that, as the planetary system depends for its health (that is, the due performance of its functions) on the law of gravitation, so the health of the vital actions depends on man’s conduct, with relation to the manner of his nutrition and mode of existence ; and that, as the planetary system is incapable of derangement while the law of gravitation remains unchanged, so neither is the system of man capable of disorder, otherwise than by some misconduct in his manner of feeding and his habits of life. Beyond the influence which results from our conduct in these two respects, we possess no more control over the motions constituting health, than we do over those of the heavenly bodies ; everything being effected by the inherent powers of the nutritive system itself, by virtue of the laws which govern that system : and to suppose that, while all other systems are fulfilled of necessity, the system of human nutrition is fulfilled *par hasard*, and



may or may not answer its intention, just as it may happen, is to suppose that which is in direct opposition to the evidence of our senses, as it regards the uniformity, simplicity, and perfection of nature; and is, therefore, directly opposed to right reason and common sense.

The instance of hereditary diseases does not invalidate this argument: because, although the inherited disease be not contracted by any error of diet and conduct in the inheritor, yet, I contend, it must have been originally derived from such a source, to the parent who first became the subject of it. For instance: a man, from high and gross feeding, contracts gout: his sons, however temperate, may nevertheless be afflicted with gout by inheritance; that is, supposing gout to be an hereditary disease, as some assert. Here you see, notwithstanding the temperance of the son, his gout was evidently the result of error in diet: not, indeed, on his own part, but on the part of his parent. And it must be remembered, that I am speaking, not of individual disease, but of disease in general.

A child may be born with some imperfection in one of the valves of the heart: but this imperfection is the result of some imperfection in the action of those vessels whose office it was to form this valve: and this second imperfection could only be derived from some imperfection in the health of the parent, induced by the causes in question. Death from dentition, again, is the result of a morbid irritability, produced partly by the imperfect health of the parent, and partly by the operation on the infant of the same causes which enfeebled the health of its parent; viz. improper diet, and improper habits.

I know there are a few diseases which result from climate, situation, soil, &c. ; but these are so few, as rather to prove the rule, than overturn the argument.

What I wished, therefore, to prove, and what I hope I have proved, is, that disease and premature death formed no part of the original design of man : and that for the long funereal list of disorders to which we are subject, with the exception of a very few, we are indebted solely to ourselves.

It seems to me, that there is but one legitimate cause of death ; and that is, old age ;—and here, as ever, nature shows herself a kind and watchful mother. There is nothing painful in death, from old age ; it makes its advance with a gradual and stealthy step, which is scarcely noted ; and the old man drops into the tomb almost insensibly ; conscious, indeed, that it cannot be far distant, but still ignorant of the moment when it may open to receive him. By imperceptible degrees, the living principle becomes more and more feeble ; the heart's pulsations less and less frequent ; the fluids circulate with diminished rapidity—a change is wrought in their quality ; they perform their several offices imperfectly ; the food is slowly assimilated ; we have bone where we ought to find cartilage ; we have flaccidity where we ought to find firmness and tension ; bones, which before were separated, now become consolidated ; the fluids lubricating the joints are deficient ; the ligaments regulating their extent of motion are indurated. Thus, the old man moves with difficulty, and his respiration is hurried and unequal on very slight exertion. The least essential parts of the body forsake him first : his hair becomes white, and falls off ; the teeth loose, and drop out ; his vision becomes

impaired, his hearing imperfect, his judgment inaccurate, his temper querulous: a little while, and he becomes perfectly helpless; his brain loses its sensibility; his memory deserts him; already the twilight of death is around him; and shortly the night of the grave closes over him, and he is no more seen. Lastly, comes Oblivion with her sponge, and wipes his name from off the tablet of human recollection; and the bustling hero of this little drama is heard of, and thought of, and finally even dreamed of, no more.

I lay this down, therefore, as a fundamental truth, that we bring disease upon ourselves, by using an improper diet, and by exercising improper habits of life; and that the only way to preserve vigorous health, and strength of mind and body, is to bring ourselves to the use of a proper diet, and the exercise of proper habits of life, as nearly as the tyranny of custom will admit. But, before we can do this, we must first ascertain what diet and habits are those which are proper to man.

Now, my dear John, when the mother of a newly-born infant dies, the physician recommends a wet-nurse for the nourishment of the infant. In the absence of a wet-nurse, he recommends that ass's milk should be given to it:—in the absence of this, cow's milk:—in the absence of cow's milk, he recommends mild farinaceous food. He does *not* recommend cold boiled beef and ale.

But why does he not recommend cold boiled beef and ale? Because he knows that these are unnatural food for newly-born infants.—Why does he recommend mild farinaceous food, in preference to beef and ale? Because this, though not the natural food of infants, is,

nevertheless, not so unnatural as beef and ale.—But why does he prefer, for the infant's support, cow's milk before farinaeous food? Because eow's milk is more naturally allied to the food of infants than farinaeous food; that is, it approaches, in its own nature, more nearly to the mother's milk than farinaeous food does.—But why does he prefer ass's milk to eow's milk? Because ass's milk is still more naturally allied to an infant's natural food than even eow's milk.—But why does he prefer a wet-nurse to all the other means of nourishment? Because human milk, though not the mother's, is the most natural of all. But why does he reecomend that mode of nourishing the infant which is the most natural? Because he believes that that mode which is the most natural is also the most proper.

Thus you see that the physieian, in selecting the food most proper for a newly-born infant, takes no other guide than Nature herself. Uninfluenced, in this ease, by his own appetites, passions, and prejudiees, he sees with a clear vision, and understands with an unelouded mind. He does not hesitate for an instant—the question requires no time for eonsideration—it is so simple and so manifest that it will not bear a doubt, or an argument for a moment. “Human milk,” says he, to all inquirers, “is the most natural food of infants, and *therefore*, beyond all doubt, question, or eavilling, the most *proper*.” He would laugh in the faee of any one who should dare to question this faet. “Nature,” he would exelaim, “is the highest of all authorities—it is the authority of God himself.” Yet only turn the tables, and inquire of this same physieian, what he eoneeives to be the diet most proper for himself. Only mark! how instantly the ease is altered. See how he

shifts, and turns, and doubts, and quibbles! How he endeavours to distort or discolour truth, and twists sense into nonsense and nonsense into sense. His vision is no longer clear, his understanding no longer unclouded. His perception of truth is instantly obscured by the mists which are exhaled from his own passions, personal prejudices, and appetites. He so loves his soup—so delights in a ragout! A bumper of hock is so refreshing, and port is so invigorating! They make him so happy—so comfortable—he cannot believe they are injurious—at least, not in his own particular case! He no longer takes nature for his guide—her authority no longer suffices—and her voice, which, in the case of selecting the infant's food, was the voice of God, becomes, in his own particular case, the voice of a lying spirit. Pitiful sophister! miserable prevaricator! as though Truth could change her essence, and Nature her immutable laws, in order to tickle the palate and accommodate the propensities of a wretched gourmand.

Surely, if that food which is unnatural to infants is also improper to infants, so also must that food which is unnatural to man be also improper! And if this be true of food, must it not also be true of habits? If nature be a paramount and indisputable authority, must she not be so in one instance as well as another?

Look through the universe—not at this or that particular part of it, but look everywhere; search minutely through all the kingdoms of nature; explore the natural world; examine curiously the artificial world—whatever you behold, whether animate or inanimate, moving or at rest, large or small, you will find it has been placed in a sphere of its own, and sur-



rounded by circumstances peculiar to itself; from which sphere and circumstances it cannot be removed, without detriment to the integrity of its natural perfection. In fact, all things—the very stocks and stones—have “habits” proper to themselves; and you cannot compel them into new habits, without injury to their primitive perfect condition. Everything has its determinate position, and fixed relation to all other things. It is this which constitutes that wonderful harmony which so astonishes and delights those who love to contemplate the works of nature. If, indeed, it were not so, nothing but the most inextricable confusion must necessarily be the immediate result.

Everything, then, has its natural sphere of existence—its natural habits; and you cannot compel it out of its sphere, without injury to the perfection of its being. I know I may be asked, if the marble, chiselled into the statue, be not an improvement upon the rugged mass? I answer, No—decidedly not. The marble is not improved: it has been made to contribute to the enjoyment of man, it is true; but this is improving the condition of man, not the condition of the marble. For, in the first place, the marble itself is unchanged, except in figure; and it has been wrested from the security of concealment in its quarry, and exposed to injuries and accidents from which it would otherwise have been exempt; its very existence as marble has been rendered precarious;—a barrel of vinegar may be spilled upon it, and so its very nature be changed, and its identity destroyed. In the next place, looking upon the whole quarry as one object, of which the statue forms only a small part, and supposing (as who shall dare to question it?) that the entire quarry was intended by nature to

answer some useful purpose in the general scheme, I ask, has not the capacity of the entire quarry, to fulfil its allotted purpose, been diminished by the forcible abstraction of a part of it? If you fell a mahogany-tree, in order that it may be wrought into billiard-tables, and side-boards, and dining-tables, I ask you again, have you committed no injury upon that tree? Have you abstracted nothing from the beauty of that scene in which that tree made a prominent object? Have you in no way interfered with the purposes for which that tree had its being? Or will you choose rather to suppose that nature planted mahogany-trees for the express purpose of ventering side-boards and dining-tables? Did they answer no intention, did they effect no useful object, before these same sideboards and billiard-tables were invented? "Oh! but," says man,

"All things were made for my use."

We have such a consummate opinion of our magnificent *selves* that whatever we find capable of being made to contribute to our own enjoyments, we instantly conclude, with a pompous vanity, not a whit less ridiculous than that of the frog in the fable, was made and sent expressly for our own behoof.

With what a proud sense of superiority do we look down upon the inferior animals!—yet how slight an accident is sufficient to degrade the most towering genius beneath the level of the most inferior? A stone in his path trips up his heels; or a little tumour forms upon his brain; or a few ounces of water collect between its membranes or in its ventricles; and, behold, the vaunted philosopher, the lord of the creation, has suddenly become a drivelling idiot! "Toi,

qui dans ta folie prends arrogamment le titre du roi de la nature—toi qui mesures et la terre et les eieux—toi pour qui ta vanite s' imagine que le tout a etè fait, pareeque tu es intelligent, il ne faut qu'un leger acciident, qu'un atome deplaeé, pour te de grader, pour te ravir eette intelligence dont tu parois si fier !”\*

But let us admit, for an instant, that all this were so—that nature planted mahogany trees on purpose to veneer Croekford's Rouge-et-Noir tables ; this detracts not an iota from the truth of what I have asserted ; because it must still be admitted, on every hand, that the tree, as a tree, “has had foul wrong.” No one can deny that a tree, which has been cut down and cut up piece-meal, has suffered injury as a tree—has had the integrity of its perfection, as a tree, destroyed. My assertion, therefore, is still sound—that you cannot withdraw any object from its natural sphere, without detriment to that object.

Here is a limestone:—it would have remained perfect limestone, probably for ever, had it been left in its natural position, the quarry. But I have withdrawn it from its natural sphere—I have broken its natural relation to surrounding objects—I have thrown it in the fire, and exposed it to a shower of rain—and, behold ! it crumbles into dust.

Here is a “winking Mary-bud:”—had I left it in the field whence I abstracted it, it would have gone on winking as prettily as any Mary-bud of them all ; but

\* Translation.—“Thou ! who in thy folly arrogatest to thyself the title of the King of nature—thou ! who measurest both the earth and the heavens—thou, for whom thy vanity makes thee imagine that all things were made because thou art intelligent—there needs but a slight accident—but a single atom displaced, in order to degrade thee, and ravish from thee that intelligence of which you seem so proud !”

I have planted it in tallow, and bathed it in ink, and, behold, it is dead!—Poor flower! How pitcously thou lookest—dropping ink, instead of dew, upon thy greasy bed! I would not serve another so to enlighten the darkness of fifty brother Johns!

Here is a watch:—I wear it in my fob—I place it beneath my pillow, or in my bed-room watch-pocket—and it never fails to indicate the time. But if I attach it to a mill-sail, or conceal it in an oven, or bury it in an iceberg, what sort of time will it keep?

Go visit the Zoological Gardens—observe the extreme care which is found necessary, in order to keep the animals in health.—And in what does this care consist? Manifestly in approximating their present circumstances, as nearly as possible, to the circumstances in which nature intended them to live. Yet, with all their care and extreme attention, there are still animals which they have not yet been able to preserve alive—much less in health! You cannot withdraw the leopard from his jungle and his tropical climate, and turn him adrift on the plains of Siberia, with impunity to himself; nor will the cedars of Lebanon flourish on the barren hills of the frozen North.

As it is with habits, so with food. All animals cannot subsist upon the same food indifferently; nor all vegetables upon the same soil. A dog will not thrive on oats, nor a horse on beef, nor a eat on green gooseberries.

Seeing, then, that every other system in the universe has its natural sphere of existence—its natural habits, from which it cannot be removed without injury—it seems only in accordance with strict analogy, to suppose that man also has a sphere of existence and

certain habitudes natural to himself; and that he cannot withdraw himself from this sphere and these habitudes, without injury to the perfection of his nature.

What is the conclusion to be drawn from these premises? It is this; that "that manner of nutrication, and that mode of existence," which is most natural to man, is also most proper to man.

E. JOHNSON.



## LETTER VII.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

IN my sixth Letter I showed you that those habits and that diet are most proper for man, which are most natural to him. I illustrated this doctrine (with regard to food) by instancing the case of a physician when called upon to give his advice as to the best manner of nourishing a motherless infant. I showed that, in such cases, he takes nature for his exclusive guide, and, without hesitation, recommends a wet-nurse. And why? solely because human milk is the natural nutriment of infants, and *therefore* the most proper. And if this be so with regard to diet, so is it also as regards habits and general regimen. The wisdom and provisions of nature are the wisdom and provisions of God; and shall the capricious inventions of art be put in competition with *His* contrivances? It may be said that the ingenuity which teaches man the practice of arts was given him also by God. But who does not see the weakness and fallacy of such reasoning? Who does not see that, if this mode of reasoning were true, it would apply, with equal force, in favour of the inge-

nuity which teaches a man to pick his neighbour's pocket, or swindle him of his property by the cunning art of forging his signature?

Well, then, my dear John—in order to ascertain what are the habits and diet most proper for man, we have now to inquire what are the most natural to him.

This, dear John, is a curious subject, and it embraces a most extensive field of philosophical speculation: it is, nevertheless, one concerning which I would have you entertain right notions; as otherwise, a good portion of my time and labour have been thrown away. Since, unless you can be made to comprehend what is most natural to you, you cannot possibly understand what is most proper for you.

You cannot take for your guide the opinion of medical men. For if you consult twenty, you will hear twenty different opinions; and which of the twenty can satisfy you that his, and his only, is the correct one? Neither do I ask you to rely on mine. I would have you trust to the *ipse dixit* of none. I would have you governed by the evidence, and guided by the light, of your own reason alone. For this is not a matter of speculative science, nor of normal art. It is a matter, simply and exclusively, of common sense.

It has been asserted that man has no natural condition; but that, into whatever state he brings himself, and with whatever circumstances he surrounds himself by the exercise of his ingenuity, that state, and those circumstances, constitute the sphere in which he was designed to exist. The same opinion has lately been expressed by a Medical Author, in one of our periodicals, with respect to diet.—“In short,” says he, “whatever kind of food the ingenuity of man has been able to

discover, that kind of food is proper for him." If the phrase had been, "the right exercise of his reason," I should have agreed with him; but the term "ingenuity" embraces, not only the use of reason, but also its abuse.

If this doctrine be sound, there is no article of diet, however notoriously unwholesome, which may not claim to be considered as the proper food of man. And if it be asked, "Why?" the answer is ready:—"Because it was discovered by man's ingenuity."

The ingenuity of the poor old women who earn a miserable subsistence by selling apples in the street, has discovered that the cravings of hunger may be more deeply allayed by a glass of gin than by bread and meat;—*therefore*, it was the design of Nature, with regard to these poor souls, that their appetites should be so appeased! Monstrous!

To me it appears, that man was designed to exist in that condition which the right exercise of sound reason shows to be most consistent with his nature.

The design of nature, with regard to the proper mode of existence amongst brutes, is rendered evident by her having bound them within the limits of their proper sphere by the force of an irresistible instinct. But to man was given reason, in the place of instinct; leaving him to use it or abuse it, at his option; otherwise she would have defeated her own design of making him a free agent.

It seems to me, therefore, that man has a natural condition; viz. that which a right exercise of sound reason leads him to adopt, as being most agreeable to his nature. He has also, therefore, natural habits, and a natural manner of nutrition; viz. those which

right reason points out, and well-founded experience approves.

I ask, is the present condition of society—are the present habits and manners of man—natural to him? That is to say, are they the result of a right exercise of sound reason? Are they congenial with his nature? Or do they result from the abuse of his reason—from pampered passions, meretricious appetites, and vicious propensities?

No one will deny, that the ultimate aim of all men's pursuits—the final goal, towards which all mankind are running, or fancy they are running—the philosopher's stone, of which all are in search—the *ultima linea* of all human hopes and human efforts—is, *happiness*.

The right exercise of a sound reason, therefore, would certainly induce mankind to choose that path which experience has proved will conduct him to happiness, and would warn him against those which the experience of ages has shown will not lead him to happiness.

The question is thus brought to turn upon this single hinge: Has man, as he now exists in a high state of refinement, chosen the right path? Does it conduct him to happiness? Or, admitting that perfect happiness is incompatible with a sublunary existence, does it ensure him the largest possible proportion of happiness of which his terrestrial existence is susceptible? If not, then he has not chosen the right path—he has not exercised a sound reason in his choice; inasmuch as he has chosen to travel in a road which will not conduct him to the object of his journey.

To prove that man, in a high state of intellectual culture, is not happy, really seems a work of supererogation;—it is only to iterate the most universally-

acknowledged of all truisms : it is merely to prove that which no one thinks of denying. Throughout all highly-civilized societies, and in all cultivated languages, the unhappiness of man has ever been a standing proverb in the mouths of all men, and a fruitful theme of declamation and lamentation, both with the philosopher, the worldling, the poet, and the preacher.—“All is vanity and vexation of spirit !”

A state of discontent is unquestionably a state of unhappiness :—and, contrariwise, I think you must be compelled to admit that contentment is happiness : for it is clear that he only can be contented who is in possession of the entire sum of all that he desires. But the entire sum of all that man desires is happiness. It is a logical *sequitur*, therefore, that he only can be contented who is in possession of happiness ; and he only happy who is contented :—and this makes happiness and contentment synonymous terms.

There can be little happiness, therefore, where there is little contentment.

But look through society at large, as at present constituted. Do you observe content or discontent to be its grand characteristic ? It is idle to deny, for it is impossible to conceal, that universal discontent is one of its most prominent features. From the monarch to the menial, “*nemo contentus*”—none are contented ; and therefore none are happy. Our whole lives are consumed in the pursuit of an unattainable object.—What is that object ? Happiness.—But why is it unattainable by us ? Simply, because we are running after it, along paths which do not lead to it.

Look again through society ; and observe our innumerable Institutions for the relief of human misery—



our Hospitals and Dispensaries — our Philanthropic Institutions—our Asylums for the Destitute—our Penitentiaries—our Mad-houses — our receptacles for reformed prostitutes, foundling children, and other unfortunates! Can that be a happy or natural state of things, which makes necessary such institutions as these? It is ludicrous to hear people boast of these establishments, as so many proofs of the blessings conferred by civilization; whereas they are, in fact, standing monuments of its shame and disgrace. Is it a credit to us, that we live in a state of society in which sickness and suffering are so rife, that thousands of public Hospitals and Dispensaries are required to administer relief to the diseased? Is it a credit to us, that destitution is of such frequent occurrence, that public buildings are necessary to receive the destitute? Is it a credit to us that we live in a state of things, the tendency of which is so frequently to overturn the human reason, that it has become necessary to provide public buildings for the reception of the mad? Can that be a meritorious condition, which makes it necessary to provide a Mendicity Society in order to restrain beggary; and a Humane Society for the prevention of suicide?

Yet, once again, look through society.—Look at our hosts of lawyers, and others engaged in the law—all of whom live, and thrive, chiefly from the proceeds of vice, dishonesty, and crime! Look at our police-station-houses, our spunging-houses, our tread-mills, our prisons, our hulks, our convict-ships, and our colonies for the reception of transported felons! Look at all this;—and then deny, if you can, that “there is something rotten in the state of Denmark.”

There is one more contemplation which must, I

think, carry weight with it, in showing how clearly and immediately crime and misery result from an artificial state of society. One of the first and greatest essentials to a highly-civilized condition of society is money : and if you reflect, for a few minutes, how innumerable have been the crimes, and consequent punishments and sufferings, which are traceable, in one way or other, up to money alone as their cause, the contemplation will be found to be perfectly appalling !

It is clear, therefore, that the present condition of highly-civilized man is not conducive to happiness ; but that, on the contrary, it is the prolific parent of multitudinous misery. It is not, therefore, a condition which the right exercise of a sound reason has led him to adopt, or which experience has approved : *therefore*, it is not his natural condition—it is not in accordance with the design of Nature—it is not the condition in which he was intended to exist.

We have just seen that the present condition of man is not consistent with his moral nature, inasmuch as it is not conducive to his happiness. Let us now enquire, whether it be in consonance with his physical nature : that is, whether a high degree of civilization and refinement be conducive to his physical health and strength.

If you survey the several grades of society, you will find that the class of men who enjoy the highest degree of health and strength is precisely that which is the farthest removed from a high degree of refinement ;—it is that which approaches the most nearly, in its habits and condition, to primeval simplicity : I mean, the tillers of the soil—the agricultural labourers. This alone is surely a strong argument that the habits of

refined society are not friendly to health and strength. Again : as a proof that a high degree of civilization is hostile to health, are not our numerous and crowded Hospitals, our multitudes of thronged Dispensaries, and our countless multitudes of medicine venders and medical practitioners, quite sufficient?

Man, in a state of primeval simplicity, inhabiting the temperate latitudes, living almost entirely in the open air, supporting life by the simplest fare, his mind undisturbed by the harassing anxieties consequent on ambitious pursuits, and the thousand other perturbing causes inseparably connected with a highly cultivated state of society, enjoys almost an entire immunity from disease. But, from the moment he begins to emerge from the primitive simplicity of his habits, and seeks to live by his wits rather than by the sweat of his brow, from that moment his intellectual and physical energies are at perpetual war with each other ; since he can only increase the former at the expense of the latter. As he advances in refinement and knowledge, he retrogrades in physical strength. And, to me, I confess, this fact alone would be an unanswerable proof, that a highly intellectualized state of society, like that in which we live, was never designed for man. It seems to me insulting to the wisdom of the Creator, to suppose that it should be so. If it had been intended that man's chief care should be the culture of his mind, it seems to me, I repeat, most insulting to Omniscient Wisdom and Omnipotent Power, to suppose that He would have so constituted him, that the very means which he must use to cultivate his mind are such as he cannot adopt without injury to his physical health, and even considerable risk to life itself.

It is certainly a natural law, that man shall preserve his health ;—this being neither more nor less than a part of the law of self-preservation. But if it be also a natural law, that man shall cultivate his intellect, then this absurd consequence arises ; viz. two natural laws, obedience to one of which necessarily involves an infraction of the other :—for nothing can be more notoriously true, than that the close confinement, sedentary habits, and perpetual tension of the mental faculties necessary to study, and the cultivation of the intellect, are highly detrimental to bodily health. We know, too, that feebleness of body has a direct tendency to enfeeble the mind : thus, the same causes which directly enfeeble the body have the effect, indirectly, of enfeebling the mind. The very means, therefore, which are necessary to educate and polish the mind, have also a strong tendency to injure it. “Intellectual cultivation,” says Dr. James Johnson, “sows the seeds of physical deterioration ;—and the evils thus inflicted on the flesh fail not to grow up, and ultimately retaliate, with interest, on the spirit.”

I am not singular in my opinion, that a high degree of civilization is inimical to health. Dr. Southwood Smith, in his *Philosophy of Health*, says : “The usual, the permanent, the natural condition of each organ, and of the entire system, is pleasurable.” And, commenting on this passage, Dr. James Johnson observes : “This might be true, if we were in a state of nature ; but in our present condition, there is scarcely such a thing as perfect health.” Elsewhere the same able author, Dr. J. Johnson, observes : “The great evil—the root of innumerable evils—the Proteiform malady, *Dyspepsy*—the hydra-headed monster of countless brood

and Medusa mein, is the progeny of Civilization." In another part of his "Œconomy of Health," he says, and most truly, that the "besetting sin of the present generation . . . is that of reading and thinking."

The immense consumption of drugs is another strong proof of the sickly health of society in general, in its present boasted era of refinement. I am sure I am within the boundary of truth when I assert, that, throughout England, there is not more than one man in a hundred who does not find it necessary, at least once in the year, "to take medicine," that is, to carry the master-piece of God's creative wisdom to the doctor, to have it mended.—Why, I would discard my tinker if my saucepan required mending so often!—"There are many millions in this country," says the author just quoted, "to whom physie is, daily, as indispensable as food!—To the luxurious epicure it may seem incredible, that within the boundaries of the British Isles there are thousands, among the opulent classes, who would give half their wealth to be able to do without food altogether—who would gladly give up the pleasure of eating, for an immunity from the misery of digesting."—Again, he says: "The state of civilization at which we have arrived produces such a wide range of 'hopes deferred,' and expectations blighted, that their effects are detected, by the experienced eye, at every step, even in the streets."—Again: "The results are read, by the observant physician, in the countenance, the complexion, the gait, the whole physical and moral constitution of the female;—results which require a new vocabulary; and would be totally unintelligible by Celsus, or even



by Sydenham, could they rise from their graves, to survey the progress and effects of Civilization.”

If further proof be wanted, to show that a highly-cultivated condition of society is prejudicial to health, we have it in the very structure of his body, and in the economy of its living actions. I have already shown you, that a vigorous circulation is necessary to vigorous contractility—that is, health and strength; and that vigorous contractility is incompatible with a high degree of sensibility.

No one, I think, will venture to deny, that cultivation and refinement have the direct effect of heightening man’s sensibility. The very word “refinement” seems necessarily to imply a superior degree of sensibility. One can hardly conceive a high degree of refinement unaccompanied by a high degree of sensibility also; for the very meaning of the term “refinement” seems to be a condition from which everything calculated to offend a delicate sensibility is removed.

Besides, one of the first effects of civilization is, to substitute the labour of the brain for the labour of the hands and feet. But the labour of the hands and feet—exercise—is necessary to the existence of a vigorous circulation and an energetic contractility; which are both incompatible with a high degree of sensibility. Exercise, therefore, has the effect of blunting the sensibilities; and, by a parity of reasoning, a deficiency of exercise has the contrary effect—that of heightening the sensibility of man. “This deficiency of exercise in the open air,” says Dr. James Johnson, “may be considered as the parent of one half of female disorders, by multiplying and augmenting the susceptibilities to all external impressions! The pallid complexions, the

languid movements, the torpid secretions, the flaccid muscles, and disordered functions (including glandular swellings), and consumption itself, attest the truth of this assertion."

The substitution, therefore, of mental for bodily labour, which is one of the very first effects of civilization, manifestly tends to heighten our sensibilities. "The superior cultivation of intellect—now so eagerly aimed at, as the means of rising in the world, indeed of getting through it—renders the feelings more acute, the sympathies more active—the whole moral man, in short, more morbidly sensitive to moral impressions. These impressions are annually multiplying in number and augmenting in intensity. The principal sources from whence they flow, in a thousand streams, on suffering humanity, are these:—the fury of politics; the hazards and anxieties of commerce; the jealousies, the envies, the rivalries of professions; the struggles and contentions of trade; the privations, discontents, and despair of poverty;—to which might, perhaps, be added the terrors of superstition, and the hatreds of sectarianism."\*—In another part of the same excellent work, the author observes: "Thus, then, a nervous temperament, a morbid sensibility, pervades the whole frame of society, more or less—a super-sensitiveness, that inflicts pains and penalties on trifling and occasional indiscretions."

It is true that refinement multiplies our pleasures, but oh! by how much the more does it multiply our miseries! It is true that it multiplies wants, the gratification of which is productive of much delight.

But who would be at pains to catch the itch, solely that he might enjoy the luxury of scratching?

Now, if it be true, that civilization and intellectual cultivation have the effect of raising the sensibility of man beyond the natural standard, then it cannot be denied that they are also prejudicial to his health and strength; since I have proved that energetic contractility, which is but another term for health and strength, cannot exist in conjunction with a high degree of sensibility.

Thus, then, it appears, that the present superlatively intellectualized state of refinement is an unnatural condition; inasmuch as it is one, which a right exercise of sound reason, and the authority of experience, unite to prove to be neither in conformity with the moral, or physical, or structural nature of man. And I have already shown you, that whatever is unnatural is also improper. His present condition, therefore, is not his proper one.

But if the present condition of man be unnatural and improper, what state is that to which right reason and experience would point as the natural and proper one; that is to say, as the one most in accordance both with his physical and moral nature?—From what has gone before, the answer is manifest; viz. that state in which high civilization and excessive intellectual cultivation do not exist:—in a word, a state of patriarchal simplicity. It would be easy to show that the patriarchal condition is also most suitable to man's moral nature; that is, most conducive to his happiness. But this does not properly belong to my subject; which has for its object his physical health and strength only.

Now let us shortly recapitulate.

In my Sixth Letter, I endeavoured to show that the human system, like all the other systems of Nature, has a natural determinate position, and natural habits; and that if it be suffered to remain in its natural position, and in the exercise of its natural habits, it will be found to be, like them, perfect in itself. I also endeavoured to show, that if any of the other systems of the universe be removed from their natural position and natural habits, it cannot be done without injury to them.

In this Letter, it has been my object to show that man has been removed from his natural position, and from the exercise of his natural habits; and that from this cause arise the disease and misery to which we find him subjected. And the arguments which I have used to prove this have been, at the same time, sufficient (at least in my estimation) to show what his natural position and natural habits really are; and therefore, also to show what habits are most proper for him—most in accordance with his nature—and, therefore, best calculated to secure to him the perfect enjoyment of health, strength, and happiness.

The knowledge of what those habits are, which are most proper for man, must constitute your rule of conduct with regard to your own. For instance, if you be convinced, from all I have said, that the primeval condition is the one best calculated to secure health and strength, you need no other guide than that conviction. You have only to reflect on what that condition was—its habits and diet; and then endeavour to reduce your own, as nearly as conventional customs will allow, to that standard. Let your habits be more hardy—your fare more frugal. Eat only that you may live; and do

not live only that you may eat. Diminish the activity of the mind, and increase that of the body. Work more and think less. Avoid the excitement of music, cards, wine, assemblies, politics, religious controversies, &c.; or share in them with the utmost moderation. The only legitimate excitement is that of exercise in the open air.

Let me not hear you tauntingly inquire, in common with those fools who mistake derision for argument, and a sneer for wit, and who are fain to cover their own folly and ignorance with the cloak of unmeaning sarcasm—let me not hear you inquire, with such small fry as these, whether I would have society go back to barbarism, live in the woods, and feed on acorns? I have nowhere expressed or hinted at any such foolish desire; nor have I given the slightest cause for such a question. By all that I have said as to the evils arising from a high degree of civilization, this has been my sole object, viz. to place in your hands an infallible test by which you may prove—an accurate gauge by which you may measure—the propriety or impropriety of any one habit or article of diet, concerning the healthfulness of which you may wish to be informed. The traveller in the desert, the prairie, or the wilderness, who takes the Polar star for his guide, does not expect to scale the heavens and reach the star itself. He finds it, nevertheless, an unerring guide towards the object he has in view. Your object is health. Take the manifest ordinances of Nature for your Polar star, and you shall surely reach it.

I know, my dear John, very well, that the general tenor of this Letter is so much at variance with the preconceived opinions of mankind, that those who are



too lazy to think for themselves, and those who think in chains, and those who are afraid to think, and those who know not how to think, will not stop to ask themselves whether it can be true ; but taking it for granted that it must be false, because in opposition to the general opinion, will pass it over as a piece of mere extravagance. I write not for such as these. But to you—who are not, I hope, of their number—I say, that a proposition being opposed to the general opinion forms no argument whatever against it ; because there is hardly any man so ignorant as not to know that there is scarcely any one well-ascertained truth which was not once in opposition to the general opinion. Leave the general opinion, then, to those who, rather than examine closely into things, are content to take them for granted :—but you, dare to think for yourself ;—and, in doing so, rest not satisfied with a shining surface, but look through and beyond the surface. I want *you* to look through the gloss, and the glare, and the glitter, and the gingerbread gilding, wherewith Civilization, like a painted courtesan, carefully conceals her deformities. I want you not to swallow the gilded nut whole ; but to crack it, in order that you may see the rottenness and bitterness which lurk within. Depend upon it, the Refinement of which we make so loud a boast, is no better than a cheat—a smiling impostor, who comes to us with a wreath of roses round her brow, and Pleasure's wine-cup in her hand, while she conceals poison and the dagger beneath her spangled robe.

I am, dear John, yours truly,

E. JOHNSON.

## LETTER VIII.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

IN this Letter I shall endeavour to give you a practical instance of the manner in which the present habits of society act in the production of disease—their *modus operandi*.

There is a condition of the body in which no actual disease—at least, no denominated disease—can be said to exist; and yet in which the whole of the living actions are deteriorated—in which no one individual organ can be pointed out as the seat of disorder, but in which all the organs perform their offices in an irregular and unhealthy manner, and that without any evident assignable cause. No part of the machine goes right. In the morning, instead of waking refreshed with new vigour, and ready at once to enter with alacrity on the business of the day, the patient is oppressed with a painful drowsiness, which he finds it almost impossible to shake off. When he has, at length, dragged himself out of bed, he moves about with a feeling of weariness, greater than he felt when he went to rest. Tired,

languid, and lazy, he feels as though he could almost give half he is worth for one hour more of sleep. His tongue and mouth are either parched, like the surface of dry toast; or foul, clammy, and exceedingly disagreeable to himself. He is unable to eat any breakfast; but is glad of a cup of tea or coffee, to cleanse his mouth and throat: and this is no sooner swallowed, than he begins to be annoyed with acid eructations, and perhaps sickness. In an hour or two he feels better, and gradually improves till dinner-time. At dinner his appetite is capricious: sometimes he can eat heartily; at others scarcely at all. First, he finds one article of food disagree with him; then another; until, at last, there is scarcely one article of diet which he dares take. After dinner, lassitude and drowsiness again attack him; and he falls asleep, or sits gaping in his chair, till tea-time, unless imperative necessity compels him to action. After tea, he again feels better:—and, indeed, from tea to eleven or twelve o'clock is the only time in which he can be said to be himself. His nights are passed either in a deep and dreamless sleep, or, more properly, stupor; or else he is restless and watchful; and has his short snatches of sleep perturbed by frightful dreams and the hideous nightmare. After slight exertion he feels disproportionate fatigue; and after a slight meal he feels as though he had eaten too much. There is a constant sense of want and sinking, or faintness, about the region of the stomach, which frequently induces him to take a glass of wine or spirit; and the sudden, but delusive, and temporary relief which he experiences from this is, I believe, one of the most frequent incentives to habitual dram-drinking—

another of the fatal effects often resulting from too implicit a reliance on experience.

He is almost ashamed to consult a medical man, for he scarcely knows of what to complain: he accuses himself of laziness—he drenches himself with physic: he is sometimes inclined to believe that it is all fancy, and he determines to fight against it, and to eat and drink like other people, and think no more about it. It is generally in the evening, when he feels a great deal better, that he takes this doughty resolution:—but it will not do. The morning comes, and with it the feverish tongue, the lethargic drowsiness, the weary limb, the languid spirit, the lassitude and listlessness, which makes his life literally burthensome. He is, indeed, in a miserable condition. Food does not strengthen him—sleep does not refresh him—mirth does not cheer him—society has no charms for him—pleasure no allurements: for him everything seems to have lost its interest. He can think of nothing but himself: his own wretched feelings are perpetually solieiting his attention, and forcibly abstracting his mind from every other contemplation. Like the owl, he mopes all day, and is only aroused into active existence at night;—and even then, should he dare to suffer himself to be tempted to indulge in a glass of wine, or a slight supper with his friends, he is haunted the whole time, and his comfort poisoned, by the dread of additional suffering to be endured in the morning. He becomes hipped, nervous, melancholy, desponding. If his friends are not perpetually sympathizing with him, he fancies they have no regard for him. If they be merry, he imagines that they are exulting over him. He feels every smile as a personal cruelty, and the voice

of mirth rings in his ear like the voice of the death-bell. His friends appear to have forsaken him\*—Heaven itself seems to have forgotten him. Thus apparently abandoned and neglected, can we wonder that the weight of all this wretchedness is more than he can bear? and that he finally welcomes suicide, as the only possible relief from an intolerable load of imaginary oppression?

There are two other states of the mind produced by this unhappy condition of body, which are very singular. The one is a sense of dread and terror, as though the patient had committed some great crime: the other is an unaccountable and almost irresistible desire to do something horrible and wicked. I have seen numerous instances of these states of the mind, manifestly depending solely upon the condition of the body I have just attempted to describe. Of the latter—an irresistible longing to do something wicked—two cases occurred to me lately. A tailor awoke his wife at midnight, in great terror, and earnestly besought her to get up and put out the night-light; otherwise he said, he felt that he must set fire to the house. He had been lying awake, he said, looking at it for the last two hours, and had restrained himself with the utmost difficulty from using it to fire the tenement. The feeling had gradually been growing stronger and stronger, until he felt it had become irresistible.

In the other case, a girl, about seventeen years of age, was drinking her tea before the fire. There was a large looking-glass over the mantel-shelf. Suddenly

\* "Is it not strange," exclaimed the elegant but dyspeptic Rousseau, "that all the world should be leagued together to oppress the son of a poor watchmaker?"



she exclaimed, in a frightened tone of voice, "Oh, mother! mother! for God's sake, take the cup and saucer out of my hand!" She did so, and asked what was the matter. The girl drew a deep breath, and said, she did not know; but all at once she felt, that if the cup and saucer were not taken from her, she must have thrown them at the looking-glass over the mantel-shelf. She dared not, for weeks afterward, look at that glass, while she had anything in her hand. Both patients were in a very ill state of health.

I have no doubt that many of the extraordinary cases of shop-lifting, of which we hear, result from the same physical causes—a desire to do something wicked, without object or motive of any kind, depending solely on a morbid condition of the health, a prurient curiosity to see whether they *could* do it undetected, a morbid and itching wonder, and entirely unconnected with moral depravity. The *opportunity* to steal breeds the *desire* to steal; and while speculating within themselves as to whether they could do it without discovery—while saying to themselves: "Now I could do it—now — and now" — a sudden and hurried impulse prompts the act, and thus the thought becomes father to the deed.

These are some of the characteristics of that bane of artificial life, commonly called "indigestion." Another group of symptoms indicative of congestion—congestion of the *capillary arteries* of the great nervous centres—a *blood-shotten* condition of the nerves and nervous centres—consists of extreme excitability, a disposition to give the greatest importance to the merest trifles, indecision of character, irritability of temper, inability to read or write, for any considerable time together, or to concen-

trate the mind and fix the attention, sense of weight and oppression on the top of the head, constriction across the brow, constipation, flushing of the face, especially after eating, terror on being left alone, indisposition to go into society, or to mix with strangers, distension of the stomach and bowels, sickness and head-ache, foul tastes in the mouth, flatulence, failure, in some shape or other, of the eye-sight, sense of great heat on the top of the head, agitation and palpitation of the heart, waking out of sleep with a sense of terror, inability to bear rapid motion on horseback, or great exertion of any kind—these form another group of symptoms which too often harass both the mind and body of the poor dyspeptic. The whole of these symptoms may not always be present at one time, nor do they always exist with the same degree of intensity; but they are, more or fewer of them, and in a greater or less degree, its unfailing characteristics: and there are few persons, excepting those who earn their livelihood by bodily labour, who do not occasionally fall into this condition to a greater or less extent;—and not a few have their whole lives embittered by it.

Now this, my dear John, is that condition of body, to avoid or to remedy which is the object of all dietetic rules; for it is that from which almost all other diseases spring. If from having neglected this previous state of things you become affected with any distinct disease, as fever, cough, pain, &c., the best and only advice I have to give you is this: “Go at once and put yourself under the care of that medical man—(not who wears the smartest coat, drives the smartest equipage, and trims his whiskers after the smartest fashion; nor who smiles with the sweetest grace, speaks in the

kindest tone, has the whitest hand, and the softest voice)—but whose general conversation bespeaks him a man of talent—a scholar—and, not a coxcomb, but a gentleman. In choosing a medical man, and in endeavouring to satisfy yourself as to his talent, you should not question him on matters connected with his own profession; because you are no judge therein—you have no means of knowing whether he answers you wisely or foolishly; but talk to him on matters of general learning and philosophy—on subjects with which you are yourself acquainted: you will thus easily fathom the depth of his understanding: and you may be quite sure, if he show that he possesses a mind capable of reasoning on the principles of science in general, that he cannot be ignorant of that particular science which he has made his especial study. For the practice of medicine is not an art, but a science: it cannot be learned by rule or by rote, as bricklayers learn to lay bricks, or a tallow-chandler to make candles. In the treatment of almost every disease, there is much to which no rule will apply; and the correct or incorrect management of which must entirely depend upon the philosophical powers and general reasoning capabilities of the mind of the practitioner who has the treatment of the case under his care.

Now let us enquire, as to what is the actual state of parts—the actual condition of the solids and fluids of the body—in these distressing circumstances of the health. I believe it to consist in sanguineous congestion in the ultimate tissue of all the organs concerned in the nutrition of the body—and, as a necessary consequence, in a deficiency and depravity of all the necessary secretions.

Everything tends to prove that man was destined to lead a life of bodily action. His formation—his physical structure generally, and that of his joints particularly—his great capacity of speed and laborious exertion—the divine injunction that he “shall live by the sweat” (not, mark you! of his brain,) but “of his brow”—the circumstances under which he first appears upon the earth—the bodily imbecility and enfeebled health invariably consequent upon a sedentary life—all go to prove that he was destined to lead a life of physical activity—of hardihood and exertion—and not of ease and luxury, nor excessive *mental labor*, which is *incompatible* with much and continued physical exertion. The circulation of the blood, by which all the actions concerned in nutrition are effected, is carried on with an increased rapidity under bodily exertion. If, therefore, a state of physical activity be natural and proper to man, so must that rapid condition of the blood’s circulation be natural and proper also; because the one is a natural consequence of the other, and the former cannot possibly exist without the latter being produced. The *natural* pulse of man, therefore, is the *rapid pulse of bodily exertion*. From this it follows, that the degree of velocity and vigour with which the blood flows through the body, during inaction, is preternaturally diminished: one of the essential means destined to propel it has been withdrawn; and a too languid circulation is a necessary result. But, as during that increased rapidity of circulation consequent on exertion, there is also an increased secretion and excretion of perspiration and pulmonary halitus; so, when the circulation is languid, these are deficient: and as these are separated from the blood, so, when they

fail to be separated, the greater must be the volume of blood remaining. Thus one of the principal natural means for reducing the blood's volume being removed, there must be accumulation somewhere; and as the larger arteries are not permanently dilatable while the veins and capillary arteries are so, this accumulation or congestion must take place in the veins and capillary or hairlike *arteries*.

The blood is propelled through the ultimate tissue chiefly by the contractile power of the heart acting upon the blood, as it were, from behind. When this power, therefore, is but feebly exerted, it is manifest that the blood will not be driven through the ultimate tissue with the requisite degree of velocity. Under these circumstances, the blood creeps sluggishly, and, as it were, lazily along the minute vessels composing the elementary tissue: they become gorged; and this engorgement operates as a still further impediment to the free flow of the blood.

But there is another most important evil resulting from this semi-stagnation of blood in the ultimate tissue. Arterial blood, when not moving with the due degree of velocity, becomes deteriorated in its properties:—for if you enclose a living artery between two ligatures, the blood so insulated assumes the black colour and other properties of venous blood.

The blood, therefore, when not circulated with sufficient energy through the ultimate tissue, becomes deteriorated in quality—and this, too, precisely where it is of the utmost importance that it should be of the very highest degree of purity:—for, as you now know, it is in the ultimate tissue of our organs that all those operations are effected on the blood on which the nutri-



tion of the body depends. The blood, when the circulation is driven on with a due degree of healthy vigour, maintains its vermilion hue and arterial character, not only as far as the extremities of the hairlike arteries, but even for some way along the beginnings of the veins. But when the propelling power from behind—that is, the power of the heart—is not sufficiently energetic, the circulation through the elementary tissue is so slow, that the blood loses its vermilion hue and arterial characteristics before it has reached the extremities of the hairlike arteries; and thus that part of the tissue which ought to be filled with arterial blood is gorged only with venous blood, from which the proper secretion necessary to the nutrition of the body cannot be separated, either in due abundance, or of a healthy quality. All that blood which, under exertion, is driven to the surface of the body, to the skin, to the muscles, and along the superficial veins, is, during inaction, sleeping and creeping, in muddy and sluggish currents, along the tortuous and delicate vessels composing the ultimate tissue of the internal organs—impeding their action, distending their coats, and disordering their sensibility.

The whole circulating system may be divided into three portions: the heart and large arteries, whose office is merely to convey the blood to the elementary tissue;—the elementary tissue itself;—and the large veins, whose office is merely to convey the blood back to the heart. Now, the principal force by which the blood is propelled from the heart through the whole of these three portions of the system, back to the heart again, is the contractile power of the heart itself. When, therefore, this power of the heart is feebly exerted, as

during inaction, although it is sufficiently strong to carry the blood to the ultimate tissue, it is nevertheless not strong enough to carry it through it: at least, not to carry it through with the same rapidity with which it is brought to it. The result is evident: the ultimate tissue being thus filled faster than it is emptied, there must accrue accumulation; that is, congestion in the delicate and most important vessels which compose this tissue; and also in the larger veins, whose office it is to convey the blood from this tissue to the heart. For if the propelling power of the heart be but feebly exerted within the tissue itself, it must be still more feebly exerted on vessels which are situated beyond it, and, consequently, farther removed from the propelling force.

One of the chief conditions of the body, therefore, in that general ill state of health usually denominated "indigestion," "bilious disorder," "dyspepsia," is congestion of blood in the ultimate tissue of our organs—the brain, the lungs, the spinal marrow, the stomach, the ganglionic system, the liver, bowels, &c.—all the organs concerned in the nutrition of the body, but especially of the arterial and venous capillaries of the nerves and nervous centres. There is congestion of the brain: the veins of this organ do not carry away the black deteriorated blood with sufficient expedition; they (the veins) become distended; and thus, occupying more room than they ought to do, exert a very considerable degree of pressure upon the surrounding parts—the origin of nerves, &c. But, besides the great evil resulting from this general pressure on, and this great irritation set up within, the brain and nerves (like the irritation produced by a blood-shotten eye), there is

another evil produced, by the accumulation of venous blood in the brain, equally important. For it is a well-ascertained fact, that this black venous blood has a direct influence in diminishing contractility and sensibility—it is even capable of utterly destroying them: it is at open war with life—it exercises a destructive and paralyzing influence on the living powers, and, wherever it accumulates, poisons the life of the part. Comparing the human machine to a watch, and contractility and sensibility to the elasticity of the main-spring, upon which the motions of the watch depend, then, I say, venous blood has a positive and direct influence in weakening this elasticity; and the several actions constituting life are injured by congestion of venous blood, as the movements of a watch would be injured by any cause which weakened the elasticity of its main-spring. The watch would lose time—its movements would be too feeble—it would go too slow. So with the human machine: its actions are enfeebled—its nutrition is languidly and imperfectly performed—it goes too slow. The indication of time is the final cause of the movement of the watch; and the nutrition of the body is the final cause of the nutritive actions. Both these final causes depend upon the healthy existence of the first cause—the elasticity of the main-spring in the watch, and contractility and sensibility in the body. It is manifest, therefore, that whatever weakens the energy of the first cause must have a direct tendency to interfere with, and prevent the fulfilment of, the final cause: that is, in the human machine, the nutrition of the body. It is this destructive influence of venous blood on the life of our organs which has caused me purposely to speak of it with so much bitterness,

whenever I have had occasion to mention it. I did so in order that your mind might be thoroughly impressed with a sense of the great and necessary distinction to be drawn between venous and arterial blood. Congestion in the *venous* capillaries of the nervous system produces torpor, lassitude, and oppression of spirits. Congestion in the *arterial* capillaries produces preternatural excitability, restlessness, irritability of temper, head-ache, heat on the top of the head, and all those symptoms classed under the head of irritation, whether of mind or body.

It is difficult to make this impression on the mind of a person not conversant with physiology. Both fluids go by the general name of blood; and this increases the difficulty, weakens the distinction, and produces confusion in the mind. It seems difficult to be understood how blood can, at once, be the support of life, and yet destructive to it. Blood is blood:—and people generally are not aware that there are two sorts of blood in the body. Blood is blood:—true; but arterial blood is not venous blood: and there is not more difference between champagne and ditch-water, than between these two kinds of blood.

One of the most common symptoms of the disordered condition of the body, now under consideration, is the appearance of small, black, irregularly-shaped specks, resembling little pieces of broken cobweb, floating before the eyes. This arises from congestion of venous blood in and about the nerve of vision—the optic nerve—and retina. This nerve is compressed by the gorged veins entering into its own structure, and also of the veins immediately surrounding it. The energies of the nerve are partially paralyzed by the debilitating and

devitalizing influence of the venous blood which has accumulated within and around it. This nerve, too, like every other part of the body, is in a state of perpetual disorganization and reparation. The disorganization goes on as usual; but the reparation (that is, its nutrition) does *not* go on as usual: its nutrition is imperfectly performed. The capillary arteries entering into the structure of its elementary tissue are filled with a blood, from which the nutritious particles, necessary to repair the waste which it perpetually undergoes, cannot be separated in sufficient abundance: its structure, therefore, becomes flaccid, and its energies consequently enfeebled. If this state of the nerve go on increasing—if these little black spots go on multiplying and increasing in size, until they form but one black speck—that is, complete darkness—you then have at once the disease called *amaurosis*, “blindness,” resulting from palsy of the optic nerve and retina.

Imperfect hearing, and ringing in the ears, are also very common symptoms of indigestion. These arise from a condition of the nerves of hearing—the auditory nerves—similar to that which I have just described as incidental to the nerve of vision. All the nerves of the body, with the questionable exception of one, arise from the brain and spinal marrow; and all are liable to be thus injuriously affected by venous congestion in the elementary tissue of these two organs. It is to this condition of the nervous system that are to be attributed all those oppressive feelings of lassitude, ennui, mental imbecility, &c., so prominently characteristic of the hypochondriacal dyspepsie.

Then we have, too, congestion in the lungs, interfering



with those important changes which should be effected on the blood in those viscera.

Then we have congestion in the stomach. In this viscus the food is destined to undergo the first important change towards final assimilation; that is, nutrition. This change is effected by admixture with the gastric juice. The gastric juice is secreted, that is, separated from the blood—that is, formed or manufactured, as it were, by the arteries entering into the composition of the elementary structure of that organ. But, in order that this juice may be secreted in sufficient quantity, it is necessary that the elementary tissue of its blood-vessels should be plentifully supplied with pure arterial blood: whereas, in congestion, this tissue, as I have before shown, is gorged with venous blood. The necessary quantity of gastric juice, therefore, cannot be formed; and that portion which is secreted is not of a healthy sort. The direct result of all this is, that the very first necessary change which should be wrought upon the food, in order that it may nourish our bodies, is very imperfectly effected—the chyme is of unsound quality. The next result is this:—the chyme, by admixture with certain other juices which it meets with in the bowels, is destined to become chyle. But the chyme, being of vicious quality, the chyle which is formed from it must be also vicious; at all events, it must be deficient in quantity. Certainly, it is impossible to suppose that as much perfect chyle can be elaborated out of bad chyme as out of good: you might as well hope to make as much good butter out of bad cream, or out of cream and water, as out of pure cream. The chyle, therefore, is deficient in quantity: but this chyle is destined to become blood. The chyle, there-

fore, being deficient, the blood resulting from it must also be deficient. But the blood is, in fact, as I have shown you before, the real food on which the body feeds, by which it is nourished, and its strength supported; and this food being scantily supplied, the strength, of course, is but ill supported.

I have said that the chyme is converted into chyle by admixture with certain juices which it meets with in the bowels. But the same causes which we have seen producing a deficiency of gastric juice, produce also a deficiency in those juices, by commixture with which the chyme is converted into chyle. Here, then, is another cause which tends to diminish the quantity of chyle; and, consequently, blood—the nourishment which we ought to derive from our food.

But there is yet another mischievous result accruing from a congested condition of the stomach and bowels, besides that of deficient and unhealthy gastric juice. In that condition of the health which I am endeavouring to describe, the stomach and bowels actually secrete *air*. It is a thoroughly-established fact, that air, wind, flatus, is actually formed from the blood, and poured into the stomach and bowels by those arteries which ought to form only gastric juice. Now this wind not only does no good in the stomach and bowels, but it does a vast deal of harm: for, besides the evil effects which it produces by its pernicious qualities, it violently distends these organs, stretching, and separating, and thus greatly weakening and destroying, the firmness and compactness of their ultimate tissue.

To give you a still further and clearer idea of the manner in which the secretions of the body may be altered in their quality, as well as diminished in quan-

tity, I have only to direct your attention to a foul tongue. Look at the tongue of a sick man : instead of being bathed in the natural, pellucid, and fluid secretion of the mouth (saliva), it is covered with a thick, and filthy, and pasty crust, which is actually solid. Is it possible to conceive that the offices intended to be fulfilled by the saliva can be properly effected, or effected at all, by the nasty, pasty filth which you behold in his mouth, instead of saliva ? This filth is secreted from the blood ; and poured into the mouth by those arteries which ought to secrete only that thin, clear, pellucid fluid called saliva. Now this is an example of vitiated secretion which you can actually see, and which cannot, therefore, be doubted or questioned. Can you have any difficulty in believing that the other secretions of the body, which are all formed from the blood, may, in like manner, be equally altered and vitiated ? Can you, moreover, have any difficulty in believing that the body must, of necessity, be badly nourished in this state of the secretions, seeing that it is by the agency of these very secretions that our food is converted into blood, which blood is the sole source from which our bodies derive nutrition and support ?

I have now described to you what I believe to be the actual condition of the body in that sickly state of the health usually denominated “indigestion ;” a condition from which few persons in the upper and middling ranks of life are wholly and perfectly free. And you will observe, that all the mischief arises primarily from depressed contractility and excessive sensibility, which are themselves the immediate offspring of excessive refinement.

E. JOHNSON.

## LETTER IX.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

IN my last Letter, I stated to you, that I believe sanguineous congestion, in the ultimate tissue of our organs, especially of the brain and other parts of the nervous system, constitutes that morbid and multiform disease usually denominated “indigestion,” or “dyspepsia.”

The immediate cause of this congestion I believe to be a sleepy, feeble, and inefficient circulation, occasioned by the peculiar habits of artificial society, the direct effect of which is to impair the contractile vigour of our organs.

Indeed, when one considers the amazing exertions which the human body is manifestly constructed for the purpose of undergoing—when one sees, every day, the extraordinary powers and wonderful activity which it is capable of exerting—and then, when one reflects upon the comparative physical inaction in which the lives of those are passed who are the victims of this disease—I mean the upper and middle orders, especially of females, and such of the lower whose occupa-

tions are sedentary—when all this is considered, I say, one is astonished, not that the health of the machine should suffer, but that it should continue to exist at all. It seems really wonderful that organs of such elaborate and delicate workmanship should be able to perform their functions at all, under circumstances so diametrically opposite as those of action and inaction. Which of these two conditions, however, is the better suited to the body, daily and hourly experience shows; since robust health, and great physical strength, are almost only to be met with in the ranks of those who earn their livelihood by bodily exertion; and since that sickly habit of body, concerning which I am speaking, is almost solely incident to those whose lives are physically inactive.

Who ever heard of a bilious post-boy, or dyspeptic ploughman? It is not amongst carpenters, and bricklayers, and sawyers, and agricultural labourers, that you will meet with the dyspeptic; but in the halls and saloons of the great, the dusky counting-houses and gas-illuminated shops of the trader, and in the ghost-like and dwarfish ranks of the pale and spectral silk-weaver. Indeed, of the many hundreds of those who have come under my observation during thirteen years, I never remember to have seen a single silk-weaver who was not more or less dyspeptic.

Another important cause of languid and inefficient circulation is, the manner in which we surround ourselves with what are called comforts. We clothe ourselves in flannel, and envelope ourselves in great coats abroad; and when at home, we close the doors, let down the window-curtains, draw a chair to the fire, bury our feet in the wool of the hearth-rug, and



make our servants wear slippers that they may not disturb us.

Now, these same comforts exert an opiate influence on the system—an influence directly lulling and somniferous. I surely shall not be called upon to prove this. Who has not himself experienced that almost irresistible disposition to sleep, which an easy chair, a warm room, a good fire, and silence, induce? And who will not sleep more soundly in a darkened room, on a down-bed, surrounded by curtain drapery, and well covered with blankets, than on a straw mattress, scantily covered, uncurtained, in a garret.

Those, therefore, who surround themselves with these seductive “comforts,” place themselves precisely in the situation of opium-eaters. They submit their bodies to the same influence, and suffer the same evils, although the cause be different. “Comforts” are opiates—anodynes—narcotics; as certainly so as opium itself, although not in so powerful a degree. They lower the tone of the nervous system, and lessen the contractile energy with which the circulation is carried on. The lover of “comforts,” therefore, must neither censure nor ridicule the eater of opium: he is himself guilty of the same fault, and will certainly reap the same harvest. I say, their fault is the same: they both are producing the same effect, only by different means: they are both travelling to the same point, only by different roads.

Like hemlock, then—like the deadly nightshade—like opium, and other poisonous narcotics—“comforts,” as we are pleased to term them, but whose proper name is “*luxury*,” have the direct effect of lowering the tone and lessening the activity of the living actions; and of

inducing that condition of the body called lassitude, excessive sensibility, &c.

Light, and wet, and wind, and cold, and noise, &c. &c., are what are enumerated among the discomfords of life. But these, and the like of these, are the natural whips and spurs which keep the living actions, as it were, awake ; they form a part of man's natural condition : they form a part of the means which nature has contrived, to keep up the activity of the machine—to prevent its going to sleep, like a lazy horse, when he no longer hears the whip, or feels the spur. These discomfords, as they are called, are to be considered as so many incentives to exertion ; for by exertion they not only (at least many of them) cease to be discomfords, but become real pleasures. What, for instance, can be more delicious than the bright and frosty freshness of the air to the active skater ? What more luxurious than water to the athletic swimmer ?

These discomfords are component parts of the system of this world : and man was made, and expressly fitted, to inhabit this world. In his construction, nature intended that his system should be adapted to the system of the world, and not that the system of the world should be altered in order to be adapted to his own sensual and animal gratification—his own love of luxury. Yet this is what we are perpetually labouring to do, in surrounding ourselves with these same comforts : for every comfort is, in fact, no more than the absence of some supposed discomfort. But, as I have shown, these discomfords form a component part of the general system of the world : and, therefore, to get rid of them, is to alter that system from its original order. But as the system of man was adapted to the

system of the world at the creation, it follows, that to alter the system, or rather circumstances, of the world posteriorly to the creation, is, in fact, to destroy the adaptation then made and effected by the Author of our existence—to destroy the relation then instituted between ourselves and the things and circumstances wherewith we are surrounded. But thus it is:—instead of being satisfied with Nature's adaptation of our system to the world, we seek to alter the world, and the order and circumstances of things, in order to adapt them to our system. Thus the sweet breath of heaven is carefully excluded by windows, and shutters, and curtains; and the cold most assiduously dispelled by fire and flannel. The rain must not wet us; the wind must not blow upon us; cold must not approach us. Thus we surround ourselves with new circumstances, in the place of those to live among which we were expressly constructed and contrived.

Nature always husband her means, and ever produces the greatest possible number of effects from the fewest possible causes. Accordingly, seeing that the system of man was destined to inhabit the world, she seized upon certain parts of the system of that world, and made them subservient to the existence of her new creation. Thus, air is absolutely necessary to the existence of man. She might have constructed him so as to live without air; but then some other contrivance must have been adopted; and to have instituted a contrivance which did not exist, in order to effect a purpose that might be as well effected by a contrivance already existing (*viz.* air), would have been to waste her means, and unnecessarily exhaust her energies, which she never does. And as air, which is one of the com-

ponent parts of the system of the world, is absolutely necessary to the existence of man, so the other so-called "discomforts" of life, such as cold, wet, hard fare, hard lodging, which are also component parts of the system of the world, are absolutely necessary to the perfection of his *healthy* existence.

As in the case of air, so in the case of other discomforts of life, Nature, it is true, could have fulfilled her task without them : she might have contrived other means to preserve the health of the human machine : but these were ready-made to her hand ; and she made use of them at once, as she always does, rather than waste her energies by the invention of new ones.

Thus are all the systems of things, animate and inanimate, dovetailed into each other. One supports another, and is itself by others supported. This is the invariable conduct of Nature. If she had to prevent two houses from falling, she would not get a prop for this and a prop for that ;—no ; she would make one house prop up the other.

It is this propping and dovetailing of one system with another which constitutes what I mean by the relation of one system to another ; as, for instance, our own system to that of the world ; and which makes it so impossible to destroy, or in any way interfere with, that relation or adaptation, without mischief to the individual system ; (which is thus, as it were, withdrawn from the support of the rest) without injury to the beauty and harmony of the whole.

Now, the things which we are accustomed to consider "discomforts" are the very contrivances by means of which our system is interwoven, as it were, with and into the system of the world which we inhabit, and are

absolutely necessary to secure this connexion. I will explain this.

You will, I hope, remember, that there are four conditions absolutely necessary to the existence of all animals; viz., organism, contractility, sensibility, and *stimuli*. The principle of these stimuli is the blood: but this is by no means the only one. There are many others; such as, light, heat, electricity, and the excitement produced through the medium of our organs of hearing and seeing, &c.: but, besides these, there are also others. And what are these others, my dear John? Why, precisely the very circumstances of our natural existence which are now under discussion:—I mean, the very self-same “discomforts” aforesaid. They form a part of the necessary and natural stimuli. As “comfort” (that is, the absence of all “discomfort”) has the effect of lulling the system to lassitude and sloth; so “discomfort,” which is the opposite of “comfort,” produces an opposite effect; viz., that of rousing the system to energy and action. He who sleeps on the hill-side, unsheltered, is not likely to *sleep* too long.

It was ordained that the human heart should continue to pulsate for a certain number of years. In order to accomplish this, it was necessary to afford to it a perpetual supply of stimulus, to a given amount. If the blood alone were capable of supplying this necessary given amount, then, when the being to whom this heart belonged came to be placed in the world which he was destined to inhabit, and within the operation of these other stimuli, he would immediately suffer by excessive stimulation, being sufficiently stimulated by the blood before he became submitted to the action of these additional stimuli. But foreseeing this evil,



Nature has so ordered it, that the stimulating properties of the blood are alone insufficient ; and this insufficiency of stimulation is made up to the necessary amount by the adventitious stimuli afforded by the nature of the circumstances with which he is surrounded, and which he is pleased to denominate “discomforts.” To remove these circumstances, therefore, is to remove a certain number of the stimuli which are absolutely necessary to the healthy activity of the living actions.

You will now clearly understand what I meant, when I said that our so-called “discomforts” are the necessary whips and spurs which keep the living energies awake. You will also now see how it is, that what we call “comforts” operate upon us like opiates ;—since, to acquire a “comfort” is only to remove a “discomfort ;” and to remove what keeps us awake, is the same thing as to administer what will send us to sleep.

The indulgences, therefore, wherewith even young and healthy men indulge themselves—the “comforts,” as they call them, of flannel, warm clothing, closed doors, carpeted rooms, soft beds, hot food, are infinitely worse than absurd ; because the opposites of all these luxuries, so far from being injurious to health, are absolutely necessary to it. We actually kill ourselves with “comforts.” It is absolutely disgusting to see the excessive care and caution with which great fellows, with rough beards on their chins, and with fists large and strong enough to fell an ox, and legs long enough to bestride the Thames—I say, it is neither more nor less than disgusting to see these lackadaisical women in the likeness of men, or, rather, these monsters, which are neither men nor women—I say, it is literally disgusting, and degrading too—degrading to our nature,

to our being—degrading to the physical energies of Nature's master-work—to see the care and pains-taking with which these abortive monstrosities, the progeny of a morbid and excessive refinement, protect their delicate and precious persons from a few drops of rain, or a little mist, or a little unusual inclemency of the weather, of whatever kind.

I got into a coach, a mile from London, the other day, because there was no room outside. The weather was dry, but cold and sharp. In the corner of the coach there sat a mighty combination of bone and muscle, thew and sinew, all assisting in the formation of what should have been a man. He was, at least, six feet high, and “bearded like the pard;” and seemed as well able to carry the coach as the coach was to carry him. As soon as I entered the vehicle, I let down the window; but before I had quite succeeded in doing so, there issued, from amidst the cloaks, and coats, and shawls, and wrappings, and muffings, in which this great thing had enveloped itself, a voice of supplication and woe: “For God's sake, do not let the window down! I am so susceptible—so extremely susceptible!”

Look at the delicate and fragile plant in your garden! see how it is buffeted by the wind, and alternately scorched by the sun, and deluged by the rain, and frozen by the frost, and spattered by the mud, and brushed and bruised by the passenger's foot! Yet how greenly and healthily it grows! Take it into your parlour, and warm it by the fire, and curtain it with flannel, and defend it from the cold, and the wind, and the rain, and the rude contact of the traveller's foot, and the other “discomforts” of its out-of-door existence.—What think you? will it continue to

flourish as greenly and healthily as before? “Oh! but,” say you, “there is a difference between a man and a cabbage!” A difference! Why I know there are many differences! A man does not bear leaves, and look green; a cabbage has neither arms nor legs; and though it has as good a heart as many who rejoice in the name and nature of man, still that heart contains no blood. But what of all this? To constitute an analogy, it is not necessary that there should be agreement in every particular. At this rate there would be no analogy between man and woman, nor even between man and man; for there are, probably, no two men in existence exactly alike. But, in all that concerns our present purpose, in all essentialities, the man and the plant are perfectly analogous, they are both living beings, destined to exist under certain circumstances—living systems, destined to occupy a certain position within the circumference of that circle of existence which constitutes the universal whole. We have seen, and we know, that we cannot remove the one (that is, the plant) from its prescribed position, without great injury to its health; why, then, do we presume that we may, nevertheless, remove the other with impunity? Those who are not conversant with animal and vegetable physiology will be astonished, upon examination of the subject, to find how little indeed is the real and essential difference between plants and animals. In all, life is the same; more or less complex, but still the same; consisting, in all, of a number of effects, resulting from, and depending upon, the four grand conditions of matter before mentioned; viz. *organism*, *contractility*, *sensibility*, and *stimuli*.

To show that the “discomforts” of life, or hardships,

as they are called. have no influence in producing disease, but, on the contrary, serve only to harden the system against it, Dr. J. Johnson has most aptly quoted some remarkable historicial illustrations. "One of the earliest and most memorable illustrations," says he, "will be found in the celebrated retreat of the *ten thousand Greeks*, under Xenophon and Cheirisophus, after the fall of Cyrus on the plains of Cunaxa. This band of auxiliaries were left without commanders, money, or provisions, to traverse a space of twelve hundred leagues, under constant alarms from the attacks of barbarous and successive swarms of enemies. They had to cross rapid rivers, penetrate gloomy forests, drag their weary way over vast and burning deserts, scale the summits of rugged mountains, and wade through deep snows and pestilent morasses, in continual danger of death—or capture, which was far worse than death. This retreat is nearly unparalleled in the annals of war, for difficulties and perils. During two hundred and fifteen days of almost uninterrupted and toilsome march, often in the face of the enemy, often between two enemies, and engaged in front and rear at the same moment, the army lost an uncertain, but not a great number of men: partly by the darts and arrows of the barbarians; partly by desertion; partly by drowning in rivers, or sinking in morasses; partly by perishing in the snows of the Armenian mountains;—but not *one by sickness!*" He mentions also, the case of Byron and his crew "Although nine-tenths of the original crew appeared to have perished by drowning or starvation, Byron makes no mention of sickness, during any period of the long and unparalleled series of sufferings to which that ill-fated ship's company was doomed." The retreat

of Sir John Moore through the mountains of Spain—the sufferings of the crew of the “Bounty,” under Captain Bligh—and the retreat of the French from Moscow—are also quoted, in proof of the same principle.

Another prevalent cause of indigestion is the depressing influence of anxiety. In the present day, with men engaged in business, the mind is scarcely ever free from care: for business is not now, as formerly, a simple matter of buying and selling, and living by the profits: it is now, rather, a matter of speculative gaming. Every trader, almost, is a speculator; and his mind is, consequently, kept perpetually vibrating between hope and fear; for he knows and feels that the turning of a straw may make him, or mar him, for ever. Never was the maxim, “Habe rem,” &c., more religiously observed than in the present day. No man is satisfied to live and rear his family to tread in his own steps. Every man is striving to be wealthy. Men seem to have forgotten that the end of existence is happiness. They appear to have adopted the belief, that they were created for no other earthly purpose than the advancement of their condition in the ranks of society. They seem content to pass through life without enjoyment; to exist in any way, no matter how miserably and morbidly, so long as they can but achieve this—apparently, to them, the sole object of their existence: thus utterly losing sight of the end, in the eagerness of their pursuit after the means.

Another cause of that degenerate state of health of which I have been speaking, is, eating too much. All other animals eat because they are hungry, and drink because they are thirsty: man eats because it is dinner-time; and, having eaten enough, uses stimulating



drinks, sweet puddings and piquant pastries, *variety of food*, in order to enable him to eat more; and then, feeling himself uncomfortably distended, drinks again, with a view to relieve the sense of oppression under which he finds himself labouring. Man, I believe, is the only animal who eats in order to induce himself to drink; and drinks in order to induce himself to eat. No other animal than himself requires any relish, saving only that of hunger and thirst.

I believe I have now enumerated what I consider as the principal causes of that disordered condition of the health, called "indigestion:" and you will observe, that they all arise from the artificial condition of society in which we live. In my next Letter I shall point out what I believe to be the only means of avoiding and remedying it.

I know it will be said in objection to what I have advanced against our luxurious modes and habits of life, that the Almighty has bestowed upon us a superior intellect for the purpose of enabling us to surround ourselves with these comforts (which are denied to the inferior animals), and in order that we might indulge in all *innocent* gratifications. Yes—but these habits are NOT innocent. How can they be innocent if (as they unquestionably and avowedly do) they injure our health, shorten our lives, and entail a sickly constitution on our offspring?

I am, dear John,

Yours ever,

E. JOHNSON.

## LETTER X.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

As I have placed excessive eating amongst the causes of depreciated health, so must I now mention temperance in food as one of the prime remedies for it, and preventives against it. Learn, therefore, now, "*Quæ virtus et quanta sit vivere parvo.*"—What and how great is the advantage of living upon little.

When we consider that the manner in which life is supported is by a perpetual wasting of the body, and a perpetual reproduction of it out of the blood—and when we remember that the simple and sole object in eating is to make up to the blood the deficiency thus occasioned in it—it must be manifest to us, that the exact amount of food required daily is, precisely just so much as shall be sufficient to restore to the blood just as much as the blood has lost in supplying the waste which the body has undergone during twenty-four hours of life.

To make this more simple and clear, let us suppose, for argument's sake, that the waste of the body in twenty-four hours is just twenty-four ounces. Now,

when these lost twenty-four ounces of the body have been restored to it out of the blood, then the blood will have lost twenty-four ounces : and the object of eating being wholly and exclusively to supply this deficiency thus produced in the blood, it is perfectly evident that the quantity of food required in twenty-four hours is precisely so much as shall be capable of conversion into twenty-four ounces of blood ; that being the exact supposed quantity which the blood had lost in supplying the waste of the body in twenty-four hours.

I do not mean to say that twenty-four ounces do indeed form the precise quantity of daily waste ; but it seemed necessary to fix on some definite and specified quantity, in order to illustrate more plainly the principle which ought to guide us in eating. There is, in fact, no fixed quantity of waste : for the quantity must always be in proportion to the extent of bodily exertion : and, for the same reason, the quantity of food daily necessary can neither be fixed, definite, nor specified.

Now, if a man eat more food than is necessary to supply the loss which the blood has suffered, one of these two things must happen ;—it must either be assimilated, or not assimilated ; or, to use the common, erroneous language, digested, or not digested.

If it be assimilated—that is, converted into blood—then it is clear that there will be more blood in the vessels than there ought to be. Let me illustrate again. Suppose the case of a healthy man—so healthy that he cannot be healthier. Let us suppose the whole quantity of blood in his body to be thirty pounds. Let us further suppose, that in twenty-four hours, one pound of his blood is lost in supplying the waste of the body. Now, if this man eat, in one day, so much food as will produce

a pound and half of blood, what follows? Why, that his blood has lost a pound of its volume, and gained a pound and half in its stead: or, in other words, that the whole quantity of blood has been augmented by just half a pound;—so that his system now contains just half a pound too much. If this man were to go on adding half a pound to his stock of blood—and if it were possible for him to escape apoplexy or some other deadly disease—and if Nature, foreseeing that her children would turn out to be gormandizers, had not, in some measure, guarded against the evil—it is plain that his blood-vessels must soon actually burst under the distension. But nature has, though only in part, made a provision against this evil: for when, after having supplied the waste of the body, there is still remaining an undue quantity of blood in the vessels, the vessels relieve themselves, and reduce the quantity of blood, by the secretion of fat; thus restoring the blood's volume to a due standard.

But the fat, *quasi* fat, is of no use whatever to the body: it does not add to its strength: on the contrary, it is an incumbrance to its machinery, and, in more ways than one, is an evil. The fat, *quasi* fat, does not form a necessary part of the body, any more than the padding and wadding of a fashionable coat form a necessary part of the coat. The padding of the coat does not add an iota to the strength and quality of the original texture of the cloth; and the coat would be just as good without it. All that the padding does, is to add to the beauty of its appearance. So of the fat: it contributes nothing to the health and strength of the body; nor does it form a necessary part of the body: it might be all cut away without detriment to the body.

and even, if it were not for the skin which covers it, almost without pain: it has nothing whatever to do with the body, saving only as it adds to the beauty of its symmetrical proportion—it has no more concern with the health and strength of the body, than the coat-padding has with the texture of the cloth whereof the coat is made.

I know that in the leanest persons there is still a certain portion of fat deposited in particular parts, as behind the eye, &c.; but this is merely for the purpose of giving to the *tout ensemble* of the body a certain appearance of symmetry and beauty of outline. What, for instance, has the fat behind the eye to do with the power of seeing? But, without it, the eye would have the disagreeable and sinister appearance of being sunken too deeply in the head.

He, therefore, who eats too much, even though he assimilates what he eats, and should be fortunate enough to escape apoplexy and some other deadly disease, does not add a single iota's worth to his strength: he only accumulates fat, and incurs the evils thereunto appertaining—one amongst the many of which I will mention—I mean, the accumulation of fat about the heart—making him puff and blow like a grampus, and interfering, to a most dangerous degree, with the heart's action.

But neither does he add to the size and weight of his body, properly so called. He may indeed add to the size and weight of his body's fatty envelope, as a tailor may add to the padding of the coat; but both the one and the other, properly so called, still remain unaltered.

A man's strength resides in his arterial current—in his muscles, and bones, and tendons, and ligaments—in



his brawn and sinew ; and his degree of strength depends upon the vigour, size, and substance of these ; and if he were to eat a hecatomb of oxen every morning for his breakfast, and, like Gargantua, swallow a wind-mill for his dinner and a church for his supper, he could not add to their size and substance one atom, nor alter their original healthy dimensions—no, not in the estimation of a single hair.

Remember, then, my dear John, that it is a most miserable and mischievous fallacy to suppose that the more a man eats, the stronger he grows. If a man require daily one pound of food to supply his diurnal waste, recollect, that although he may eat double that quantity, yet he will be not one atom stronger, nor longer, nor broader, than if he had eaten no more than the one necessary pound. He may have enveloped himself in an extra layer of fat—he may have added another portion of padding to the coat ; but he himself, like the coat, will remain in *statu quo*, with the chance of being found, some morning, dead of an apoplexy. He who eats more than he wastes, with the view of making himself stronger, is guilty of precisely the same folly as he who should continue to pour water into a vessel which is already full, with the view of filling it fuller.

But, in some constitutions, if a man eat greatly too much, the secretion of fat may not be sufficient to relieve the overburthened vessels. Now, if this man should escape the usual disease resulting from plethora, then there is, in literal fact, a very great danger that some one or other of his vessels may, indeed, actually burst ; and so destroy him, by bleeding from the lungs, or some other active and deadly hæmorrhage.

Tell me, John, what warranty have you that your constitution is not one of this kind ?

We arrive, therefore, at this inevitable conclusion, viz. that he who eats more than is necessary to supply his waste, even although the whole be well and truly assimilated, not only does not increase his strength thereby, but really incurs the danger of destruction from several probable causes, and is constantly walking heedlessly in the "valley of the shadow of death."

But, if the other and more frequent circumstance happen—if what is eaten be not properly assimilated—then that which remains unassimilated becomes a source of great irritation and numerous morbid symptoms, as I have explained to you in a former letter : it ferments in the stomach and bowels, as it would do in any other close, warm place ; and the gases given out during this fermentation, and the acids generated thereby, are neither more nor less than poisons, and, of course, highly injurious to health.

If, therefore, a man, under these circumstances, eat more than is necessary, nothing can be more manifest than that he only adds to the evil he wishes to remove. For, since his assimilating powers can only assimilate just sufficient to supply the body's waste—and, in these circumstances, not even so much—it is surely most clearly evident, that, by adding to the quantity eaten, he only adds to the quantity which is destined to be left unassimilated, and, therefore, to give out a still greater portion of those poisonous gases and acids above-mentioned ;—and an increased quantity of these poisons must produce an increased quantity of mischief to the health. And thus it becomes plain, that so far from

growing stronger, he will only become weaker, and worse nourished, the more he eats.

Thus, from the very nature of the animal system—from the very manner in which life is supported—it is manifestly impossible to add to the natural standard of health and strength by increasing our quantity of food—whether that food be well assimilated or not: and it is equally clear, that when the health is weak, and the assimilating powers thereof feeble, that eating more is not the proper remedy. For, certainly, the assimilating powers, which are not equal to the assimilation of one pound of food, must be still more unequal to the assimilation of two. And it is also plain, that, under these circumstances, the proper way to improve the health is to diminish the amount of daily food; since those powers, which are inadequate to the assimilation of a pound, may, nevertheless, be equal to the assimilation of eight ounces.

I have said, that the quantity of food taken daily should be just sufficient to restore to the blood what the blood has lost in restoring the waste of the body, and that it should always be proportioned to the degree of bodily exertion undergone.

You might here very properly inquire, how we are to know the exact amount of this daily waste, so as to apportion the quantity of food thereto. Are we to weigh ourselves every morning, in order to ascertain this important fact? No, my dear John: Nature has not left any part of her master-miracle incomplete; which it would have been, assuredly, had she not provided us with infallible means of knowing, not only when, but how much, we ought to eat and drink.

When you are excessively thirsty, and when you are

in the act of quenching your thirst with a draught of cold water (which I shrewdly suspect is but seldom), tell me, how do you know when you have drunk enough? One token, by which you know this, is the cessation of thirst;—and this, of itself, should be sufficient;—and, in truth, so it is, when you drink water, I dare say. But there is still another; and one which not only informs you when you have drunk enough, but which also prevents you from drinking more. While you are in the act of drinking, and before your thirst has been allayed, how rich, how sweet, how delicious is the draught, though it be but water! But no sooner has your thirst been quenched, than, behold, in an instant, all its sweetness, all its deliciousness has vanished! In a moment, how insipid it has become! It is now distasteful to the palate—positively disagreeable—it has lost its relish. To him then who requires drink, water is delicious:—for him who does not require drink, water has not only no relish, but impresses the palate disagreeably, by its very insipidity. Carry this a step farther. To a man labouring under the very last degree of thirst, even foul ditch-water would be a delicious draught; but his thirst having been quenched, he would turn from it with disgust. In this instance of water-drinking, then, it is clear that the relish depends, not on any flavour residing in the water, but on a certain condition of the body. If, therefore, we only took drink when drink was required, pure water would be sufficiently delicious: but we seek to give to our drink certain exciting and racy flavours, as a substitute for that relish which should, of right, reside in ourselves;—and we do this in order to enable ourselves to drink when drink is not required. It

is absurd, therefore, to say that you cannot drink water because you do not like it, for this only proves that you do not want it; since the relish with which you enjoy drink depends upon the fact of your requiring drink, and not at all upon the nature of the drink itself.

Now, apply all this to eating, instead of drinking. Place before a hungry ploughman stale bread and fat pork, flanked by a jug of cold water. While his hunger remains unappeased, he will eat and drink with an eager relish: but when his hunger has been satisfied, the bread and meat and water will at once have lost what he before supposed to be their delicious flavour. I say "supposed;" because, in fact, the relish only existed in his own appetite—in the condition of the nerves of the palate, produced by hunger. And it is to produce artificially, and when it is not required, this condition of the palatal nerves that we use highly-flavoured food; for, in eating, we seem to have entirely lost sight of the true object of food; and only eat for the sake of the enjoyment which the act of eating affords us.—But to return to our ploughman.

When his appetite has been fully appeased, his food seems to have lost at once all its flavour: the attempt to eat more would now produce a feeling of disgust; and, if he were to persist, would, in all probability, make him sick.

If, then, we ate only simple and natural food, plainly cooked, there would be no danger of eating too much;—the loss of relish, and the feeling of disgust consequent upon satisfied hunger, would make it impossible. And I affirm, that there is just as much reason to believe



that this sense of disgust is as much, and as truly, a natural token, intended to warn us that we have eaten enough, as the sense of hunger is a token that we require food.

Hunger is an instinct;—disgust is an instinct. Instinct signifies an inward pricking, an internal sensation, prompting us to some external action. It is by virtue of this, that the infant is enabled, untaught, to perform the complicated action of sucking. Nature has supplied us liberally with these instincts—instincts teaching us, not only what to do, but also what to leave undone. These warning sensations may be called Nature's code of instinctive laws for the regulation of man's conduct, as it regards the preservation of his health. Thus, hunger teaches us when to eat:—thirst, when to drink:—and disgust or disrelish, when we have eaten and drunken enough. Weariness teaches us when to rest: and that feeling (to which I can give no name) which induces the healthy child to run, and leap, and toss its arms, and shout—which causes the horse in his meadow to curvet and capriole, and exult in his strength—it is this feeling, call it what you please, which teaches us that we have rested enough, and that the time for action has come. Drowsiness teaches us that we require sleep: the internal sensation, whatever it be, which awakens us, teaches us that we have slept enough. But I need not multiply instances. The voice of Nature is, in fact, never silent;—for when we are doing what she requires, in obedience to her laws, and when, therefore, it is not necessary to warn us, even then her encouraging voice is heard in the pleasure which we feel.

In the infancy of creation—

“When the world was in its prime;  
 When the fresh stars had just begun  
 Their race of glory; and young Time  
 Told his first birthdays by the sun;—

while man was yet content to listen with respect to the lessons of his parent Nature—he regulated his conduct solely by these instinctive laws. But Refinement, with her harlot smile and syren voice, stole upon his retirement, and he no longer heeded the plain lessons of his simple teacher. The Appetites and Passions usurped her throne; and incontinently set themselves to work, to alter, amend, and modify her laws. But, unfortunately, they were all so drunk when they undertook the task, that they spilled the ink over the page, blotted the manuscript, and rendered it nearly illegible for ever.

To illustrate this:—I have said, that as hunger instructs us when to eat, so disrelish teaches us when we should desist. But by what labour, and pains, and contrivances, has the unnatural art of cookery endeavoured to annul this law? For what are the spices, and sauees, and gravies, and kickshaws of the cook, but so many provocatives to induce him to eat more who has already eaten enough?—to provoke him to drink who is not athirst—and him to eat who is not hungry? The very *ne-plus-ultra* of the cook's art is to destroy this sensation of disrelish; which is almost as necessary to our health as hunger itself. According to Dr. Fordyce, “it is a universal maxim” in the Black Art—that is, the art of cookery—“never to employ one spice, if more can be procured.” Now, pray open both your eyes, and mark the object of this;—“the object in

this ease," says he, "being, to make the stomach bear a large quantity of food without nausea!" So that the object of modern cookery is, to cram into the stomach as much as it can possibly hold, without being sick. *Proh pudor!* Said I not well, when I called modern cookery the "Black Art?" Yet this is one of the elegancies of modern refinement! We stimulate our palates with wine, that we may relish more food; and then swallow more food, that we may relish more wine:—

"We swallow firebrands in place of food;  
And daggers of Crete are served us for confections."

And this is feeding, according to the improved method—according to the rules and regulations of refined society! Why, the very hog that revels in the garbage of the shambles—all hog, and beast, obscene and filthy as he is—is, nevertheless, not beast enough for this! What difference does it make, in the true spirit and very reality of the thing—what real difference, I say, does it make—whether you force down your throat more food than you want, by means of a glass of wine, or by means of a long stick, as they cram Norfolk turkeys? "The rose by any other name would smell as sweet;" and cramming is cramming, call it by what name you please, and effect it how you will.

But it may be said, that if it were not for these provocatives, persons with delicate stomachs would not be able to eat at all. Nonsense. He who says this, is either a fool or a Jesuit. If they do not eat, it is because they have no appetite. What they want, then, is not food, but an appetite for food. They want one thing, but seek another. The stomach "asks for an

egg, and they give it a stone." Let them use the necessary and natural means to procure an appetite, and they will require no other provocative: but they are "corrupti judices," and "malè verum examinant."

—“Leporem seetatus, equove  
 Lassus ab indomito; vel si Romana fatigat  
 Militia assuetum græcari; seu pila velox,  
 Molliter austerum studio fallente laborem,  
 Seu te diseus agit; pete eedentem aera diseo.  
 Cum labor extuderit fastidia, siceus, inanis,  
 Sperne cibum vilem; \* \* \*  
 \* \* \* eum sale panis  
 Latrantem stomachum bene leniet. \* .  
 \* \* \* \* \*  
 \* \* \* Tu pulmentaria quæra  
 SUDANDO.”\*

Let me say a word or two on the subject of hunger. In the upper and middle ranks of life, I believe that true, genuine, honest, sehoolboy hunger is almost wholly unknown. Is this because hunger is a feeling not proper to men as well as boys? Ask the shipwrecked sailor. No: it is because here also, as in the instance of disrelish before mentioned, modern habits have stepped in, and amended—should I not rather say mongrelized?—the natural feeling. It is true, that when

“The tocsin of the soul—the dinner-bell”—

ealls us to dinner, we feel a something which we eall

\* Translation. “After having wearied yourself with hunting, or backing an unbroken colt—or, if the Roman military exercises be too fatiguing for the effeminacy of your Greek habits—if either the tennis-ball or quoits please you better, seek the quoit-ground or tennis-court—and when exercise shall have banished fastidiousness, then, hungry and parched with thirst, despise common fare if you will. Bread and salt is fully sufficient to soothe a barking stomach. Seek thou no sauce other than SWEATING.”

hunger: but this is not hunger: it is a sense of want, of the same nature as that which the dram-drinker feels when the hour for his dram comes round. It is the eustomary excitement which we miss and want: it is this, and not food, which the stomaeh is then craving. There is not one in a seore, of those of whom I speak, who, when the toesis sounds, although he may complain that he wants his dinner, could sit down with no other drink than water, and dine on bread and cold meat. Yet, surely! surely! bread and cold meat are all that genuine and natural hunger should require! What would you say to the beggar at your door, who should tell you that his stomaeh was so delicate that he could not eat cold meat and bread?

But if they could get it down, it would not allay the feeling which they call hunger. Why? Because that feeling is, in truth, not hunger, but a feeling which a pint of wine would allay more readily than food. Thus we eat for the sake of the stimulus which our highly-dressed dinners afford us; seeming to forget entirely that nourishing the body has anything to do with the matter. But to return.

The rule, therefore, which is to regulate your quantity of food, is to be found in that sensation of disrelish which invariably succeeds to satisfied appetite; provided always, that your food be plain, and your drink water. If you be content to live thus, you will never eat too much, but you will always eat enough. But if you would rather incur the penalty of disease than forego the pleasure of dining daintily, all I can say is, you are welcome to do so:—but do not plead ignorance: blame only yourself.

One of the means, therefore, of preserving the health,



is a spare diet ;—I say “ spare,” because the upper and middle classes, together with that numerous class of persons consisting of manufacturers, whose employment is sedentary, such as weavers, tailors, shoemakers, milliners, &c. &c., with counting-house clerks, and journeymen tradesmen of the better order, such as mereers, linen drapers ; and, indeed, shopkeepers, of all grades, whose chief work consists in chaffering behind a counter ;—I say “ spare diet,” because these persons undergo but little bodily labour, and the bodily waste is, consequently, small : they require, therefore, a correspondent small quantity of food ; and if they be not careful to distinguish between true hunger and that feeling of want and languor which arises solely from a distressed state of the nervous system, resulting from the nature of their employment, and from their “cabin’d, cribbed, confined,” and sedentary habits, they will be constantly falling into the error of eating too often and too much : because, mistaking this feeling for hunger, they will eat with a view to relieve it ;—and for a short, a very short time, the stimulus afforded by the presence of food will relieve it. But if they do this, they will commit the grievous error of perpetually adding to the mischief which they seek to remedy : for this distressed state of the nervous system is peculiarly unfavourable to assimilation ; and if they eat too often, or too much, they will inevitably become miserable dyspeptics. What they want is, excitement, not food. And how is this excitement to be procured ? and in what should it consist ? Be patient, my dear John ; I will tell you presently.

## STIMULANTS.

Are stimulants—by which I mean ardent spirits, wines, and strong ales—are stimulants necessary? Are they pernicious? or are they neither the one nor the other? I assert that they are, in every instance, as articles of diet, pernicious; and even as medicines, unnecessary; since we possess drugs which will answer the same intentions, in, at least, an equal degree. But it is only as articles of diet that we are here to consider them.

Wine, spirit, and ale, are all alike, as it regards the fact of their being stimulants. they only differ somewhat in kind and degree.

I shall speak, for the present, only of wine, for the sake of convenience. But whatever I shall say of wine, is to be considered as equally true of the others: and if what I have taught you, in my preceding Letters, be true, what I shall say now of stimulants must be true also.

If wine be productive of good, what is the nature and kind of good which it produces? Does it nourish the body? We know that it does not; for the life of any animal cannot be supported by it. Besides, if you have understood what I have said as to the nature, manner, and mechanism of nutrition, you will see at once, from the very mode in which the body is nourished, that whatever is capable of nourishing, must be susceptible of conversion into the solid matter of the body itself. But fluids taken into the stomach are not capable of being transmuted into solids, but pass off by the kidneys, as everybody knows.

If, indeed, the fluid drink contains solid matters sus-

pended in it, then these solid matters can be assimilated to the solid body, and so are capable of nourishing it; as in the instance of broths, barley-water, &c. &c.; but the fluid in which these solid particles were suspended, must pass out of the body by the kidneys. Nothing, therefore, can contribute to the nourishment of the body which is not itself solid, or in which solids are not contained. Milk, the moment it reaches the stomach, is converted into curds and whey. The whey passes off by the kidneys—the solid curd nourishes the body.

If, then, it be said, that although wine is incapable of nourishing the body wholly and by itself alone, it may yet contain some nourishment, it is clear that this nourishment must depend upon whatever solid particles are suspended in it.

Now, if you evaporate a glass of wine on a shallow plate, whatever solid matter it contains will be left dry upon the plate; and this will be found to amount to about as much as may be laid on the extreme point of a penknife blade; and a portion—by no means all, but a portion of this solid matter, I will readily concede, is capable of nourishing the body—a portion which is about equal to the flour contained in a single grain of wheat.

But still I am entitled to ask what good you propose to yourself by drinking wine? Because, if you really drink it for the sake of the nutriment it affords you, then, I say, why not eat a grain of wheat, instead of drinking a glass of wine; from which grain of wheat you would derive just as much nourishment as you would from the glass of wine? And by eating which, instead of drinking the wine, you would avoid the mischief which must necessarily be inflicted on your

stomach by the deleterious spirit contained in the wine. Why go this expensive, and, as it were, roundabout way, in order to obtain so minute a portion of nutritious matter, which you might so much more readily obtain by other means—and without the necessarily accompanying evil inflicted by the spirit contained in the wine?

Wine, therefore, possesses no power to nourish the body; or, at least in so minute a degree as to make it, as an article of nourishment, wholly unworthy notice.

Does it strengthen the body?—Let us see.

I have proved to you, in my former Letters, that health and strength depend upon a high degree of contractility: and I have proved, also, that a high degree of contractility can only exist when the body is rapidly and well nourished. Whatever, therefore, is capable of strengthening the body, must do so by increasing the contractility of its fibre: and whatever is capable of heightening contractility, must do so by a vigorous and rapid nutrition of the body. But we have just seen that wine possesses scarcely any nutritious virtues at all. How then can it strengthen the body? It cannot:—it is manifestly, demonstratively, glaringly impossible. But to nourish and strengthen it, are the only two good things which any kind of nutriment is capable of contributing to the body. I have just proved that wine possesses no power to effect either of them: it follows, therefore, as a direct necessity, that it is productive of no good at all.

Is wine certainly pernicious?

I have already proved that it is unnecessary: and it has ever been universally held, by medical philosophers

that whatever is unnecessary is detrimental. The simple fact then that wine is unnecessary, is a sufficient proof that it is injurious. Nor is the truth of this medical maxim at all wonderful. The finest hair introduced amongst the machinery of a watch is sufficient to derange its movements. And when one considers the exquisite delicacy of those properties on which life and health so mainly depend—I mean, contractility and sensibility, as well as that of the whole nervous system—one cannot certainly feel surprised that anything brought into contact with them, which is not strictly proper to them, should disorder the nicety of their delicate functions. But I have other proofs.

You will admit, at once, that the practice of drinking is followed by a high degree of morbid sensibility :—witness the nervous and tremulous anxiety of the *débauché* on the morning following a debauch. But I have long since shown you, that increased sensibility and vigorous contractility are incompatible ; and that whatever augments sensibility must have the effect of lowering contractility. But health and strength depend on vigorous contractility. If wine, therefore, heightens sensibility, it must diminish contractility ; and thus, by impairing that property, impair the health and strength which depend on that property.

Again, if you will allow it to be true, that it is the sensibility of our organs which establishes the due relation between ourselves and external objects—teaching us what is good for us, and what injurious, by the pleasure or pain which the several external objects confer or inflict—then it again follows, *par nécessité*, that wine is hurtful ; because wine, when tasted for the first time by unsophisticated palates, always impresses



them disagreeably. To him who swallows a glass of raw spirit for the first time, the effects are painful to a high degree—almost suffocating. And no child would like wine or beer, unless taught to do so by precept, example, or habit.

Again : What is poison ? Is it not any substance which, when taken into the system, has the effect of disordering some one or more of the actions which make up the sum of life ; and which, if taken in sufficient quantity, will destroy life itself ? This is the true definition of poison. Is it not, also, the strictly true definition of ardent spirit ? Spirit has the effect of disordering the nervous system to so great a degree, as to produce intoxication ; exciting the brain, sometimes to madness, always to folly, in an extraordinary manner. Is not this to disorder the functions of life ? And if it be taken in sufficient quantity—if a man swallow a pint of overproof rum at a draught—will it not kill him ? It will. Wherein, therefore, does spirit differ from poison ? Only in the dose.

Aye, but (you may say) it is only poisonous when taken in sufficient quantity ! True :—neither is prussic acid, neither is arsenic, neither is mercury, neither is opium. All these poisons are daily given by medical men, without destroying life. Why ? Because they are not given in sufficient quantity. But will you, therefore, contend that they are not poisonous ?

It is the effect of prussic acid to lower the nervous system below the natural standard. It is the effect of ardent spirit, first to excite the nervous system above, and then to depress it below, the natural standard also. Both these effects are poisonous—both will destroy life, if carried far enough : neither will destroy life, if not

carried far enough. Prussic acid, therefore, and ardent spirit, are equal poisons: though neither will destroy life, unless taken in sufficient quantity. But would you willingly continue to swallow prussic acid daily, merely because you admire its delicious flavour, comforting yourself the while, by saying, that it could do you no harm, because you did not take it in sufficient quantity to destroy life? And, above all, would you do so, knowing it to be unnecessary?—Yet have I not proved that wine, spirit, and ale are unnecessary?

But if you be impenetrable to rational argument, you dare not deny the result of direct experiment. Observe:—"Sir Benjamin Brodie found, that by the administration of a large dose of alcohol (ardent spirit) to a rabbit, the pupils of its eyes became dilated, its extremities convulsed, and the respiration laborious; and that this latter function was gradually performed at longer and longer intervals: and that it, at length, entirely ceased. Two minutes after the apparent death of the animal, he opened the thorax (chest), and found the heart acting with moderate force and frequency," (now, mark what follows!) "circulating dark-coloured blood. The same phenomena resulted from the injection of two drops of the essential oil of bitter almonds" (the active principle of which is prussic acid), "diffused in half an ounce of water, into the bowels of a cat."\*

Here, then, we have direct and irrefragable proof that ardent spirit is not only a poison, but a poison of the very same nature as prussic acid—producing the same effects—killing by the same means, viz., by paralyzing the muscles of respiration, and so preventing the necessary change of the black blood into vermilion

\* *Paris's Pharmacologia*, vol. 1, p. 241. Sixth Edition.

blood ;—about which black and vermilion blood I have said so much, in my Letters.

The strength (that is, the intoxicating power) of wine and ale depends upon the ardent spirit which they contain.

A great deal of mischief has arisen from the misapplication of the term “strength” to the intoxicating power of “strong drinks,” as they are called. Potions are said to be “strong ;” and thenec, I have no doubt, first arose the silly notion that they possess the power of strengthening the body—of communicating some portion of their own strength, I suppose, to the body of the potator. People seem to suppose that by swallowing strong drinks they actually swallow strength ; as though strength were some tangible substance, which can be chewed, swallowed, and assimilated, like a potato. We say that onions have a “strong smell ;” and we might as well expect to derive strength from smelling onions, as to do so by drinking fluids which have a strong flavour. We call them strong because they affect us strongly. And this, of itself, is another proof of their mischievous tendency ;—for whatever affects us strongly, cannot be “chip-in-porridge ;” and if it be not good and necessary, it must, of necessity, be not only simply injurious, but very highly so.

But, after all, my dear John, mankind in general know how to live, as well as I can tell them. They do not err from ignorance. They are spell-bound by passion—seduced by pleasure, and hood-winked ;—but they are hood-winked willingly. They know that spirit, wine, ale, &c., are unnecessary, and even hurtful. All writers, in every age, have written in favour and praise of temperance, both in eating and drinking. Universal

experience proves its necessity, if we would possess the "*mens sana in corpore sano.*" Individual experience proves it equally:—the horrible sensations felt in the morning after a debauch—the frequent necessity which most men have been under of desisting wholly from intoxicating drinks in order to recover their lost health—the utter loathing with which he who is not habitually a toper regards, next day, the beverage which intoxicated him—and fifty thousand other tokens, too clearly evident to be mistaken. The very word "intoxicate" signifies "to shoot with poisoned arrows." If men really thought that daily doses of wine, and spirit, and ale, were necessary to improve their health and strength, those who could afford it would give them to their favourite hunting horses and their pet dogs. Yet they do not this. The training jockey does not mix wine, or brandy, with the daily allowance of water to the horses he has under training for the course. All men know that luxurious feeding is injurious to health, and rigid temperance beneficial. All teachers have taught it, and all experience proves it. *Ἐπει τι*, said Euripides, hundreds of years ago,

*Ἐπει τι δεῖ βροτοῖσι πλὴν δυοῖν μονοῖν,  
Δημητρος ἀκτῆς, πωματος θ' ὕδρηχου*

that is: "What need has man of more than two things only—bread and water?" But the fact is, my dear John, the rogues like it, and will have it, right or wrong;—or, if they be blind, they are, at all events, determined not to be cured of their blindness. They had rather not see the evils they incur, than sacrifice the pleasure of incurring them. What they really want, is some rule which shall enable them to continue to

enjoy the table and the bottle, and yet escape the consequent evils. They want a sort of impenetrable armour—a kind of philosopher's stone—some magic elixir, which shall confer on them a talismanic immunity from the evils of intemperance. They would fain discover some Styx, wherein to baptize themselves, and become invulnerable to disease. If a thousand men were to read this Letter, there probably would not be one but would see, and feel, and acknowledge, that its doctrines are true; but it is no less probable that every man of them would close it when he had done, and call for his brandy-and-water with as much composure as though he was doing the most sensible thing in the world. Or perhaps they would each remark: "Well! I have drunk brandy-and-water for these twenty years, and I do not see that it has done me any harm; so I shall e'en go on as heretofore." Yet, if an impertinent countryman insult him in the street, he must pocket the affront, and slink off, or suffer all the trouble and inconvenience consequent on sending him to the station-house, instead of quietly knocking him down where he stands. Why is this? Why! because his brandy, and wine, and luxurious habits, and full feeding, have rendered him no match for the hardy countryman. Yet he presumes to say, that his brandy-and-water has done him no harm, forsooth!—"I have drunk a gallon of beer every day," once boasted a certain hostler, "for the last thirty years, and I never was in better health than I am at this moment." The next day a fit of apoplexy laid him dead in a ditch.

But does there really exist any such philosopher's stone as I have mentioned above? Are there any



means by which a man may enable himself to indulge freely in the pleasures of the table with impunity? I believe such means do exist—not of escaping with absolute impunity, but certainly with comparative impunity. And I believe, moreover, that I shall confer a more acceptable benefit by pointing out these means, than if I were to write a wagon-load of volumes, all crammed with dietetic rules from “title-page to colophon.” But do not, my dear John, like the “*profanum vulgus*,” despise the means which I shall point out to you, because of their simplicity. The world seldom attach much value to things which are plain and easily understood; only bestowing reverence on things which they can by no means understand—things complicate, mysterious, and incomprehensible. But be you wiser. The dervish, in the Eastern allegory, well aware of this weakness, knew that it would be in vain to recommend the sultan, for the cure of his disease, simply to take exercise. He knew that mankind in general require to be cheated, gulled, cajoled, even into doing that which is to benefit themselves. He did not, therefore, tell the sultan, who consulted him, to take exercise; but he said to him, “Here is a ball, which I have stuffed with certain rare, costly, and precious medicinal herbs.” (If they had not been costly and precious, the sultan would have thought nothing of them.) “And here is a bat, the handle of which I have also stuffed with similar herbs. Your highness must take this bat, and with it beat about this ball, until you perspire very freely. You must do this every day.” His highness did so; and, in a short time, the exercise of playing at bat and ball with the dervish cured his malady.

Now, my dear John, this same *exercise* which cured the sultan, is precisely the talisman which I am about to recommend to your adoption, as the chief means of remedying bad health, and of preserving that which is already good.

Ever yours,

E. JOHNSON.

## LETTER XI.

*Umberslade Hall, near Birmingham.*

MY DEAR JOHN,

BEFORE I enter into particulars, I beseech you to recollect what I have said to you in one of my former letters; viz. that if you admitted the truth of what I then said, you would not afterwards be at liberty to dispute the truth of what I am about to say now; any more than he who admits the truth of the doctrines taught in the First Book of Euclid, can afterwards deny the truth of those taught in the Second;—because, if the one be true, the other, of necessity, must be true.

Before you proceed further, therefore, do me the favour to re-peruse carefully and attentively my Fourth and Fifth Letters. In doing this, pay particular attention to the definition of life—the manner in which it is supported; viz., by the perpetual wasting and regeneration of the body out of the blood—to the definition of health—to the description of the functions performed by the contractility and sensibility of our organs—to stimuli—to the uses of the circulation of the blood—to the different characters of the two sorts of blood con-

tained in the body, &c. &c. By the way, all the subjects are not embraced in those three Letters; but, as it is absolutely necessary that all these should be well understood before you can clearly comprehend the full force of what I am now going to say, you had better carefully re-peruse the whole, before you proceed further.

Supposing, then, that you have done this, and done it understandingly; and supposing that you assent to the several definitions which I have given of life, health, nutrition, contraetility, sensibility, stimuli, &c.; and supposing that you see no reason to doubt the accuracy of my statements relative to the offices performed by the absorbents, secreting glands, circulation of the blood, &c.; I now proceed to point out to you my reasons for recommending *exercise* as a talismanic agent in the prevention and cure of disease; entreating you always to remember, that by disease I here mean solely that depreciated state of the living actions—that sickly condition of the body—in which there is no structural lesion of the organs—in which no single organ is affected by any accidental disorganization, or defined and denominated disease—but in which all the nutritive actions are feebly performed, and in which the general tone of the health and strength is universally lowered: in a word, I mean that anomalous state of the health usually termed “*indigestion*,” or “*dyspepsia*.” And if I can teach you how to avoid this, I shall have taken a large stride towards teaching you how to escape almost all other disorders, especially chronic disorders: for, for the most part, it is general disorder which produces local disease, and not local disease which produces general disorder. But to proceed:—

Life, in the wide and physiological acceptation, consists of all the actions of which living beings are capable; not only the internal actions, as of the heart, vessels, &c. &c., but also of the external actions, as of the limbs in running, leaping, &c. But in a medical point of view, when speaking of life, the internal actions only are indicated—those invisible and inappreciable molecular motions which are constantly going on in the ultimate tissue of our organs, and by which nutrition is effected.

All physiologists agree that life consists in the constant wasting and reproduction of the body, particle by particle—by a perpetual analysis of the old particles composing our organs, and a perpetual synthesis of new particles derived from the blood—by a perpetual pulling down of the old materials, and a perpetual replacement of them by new—by perpetual disorganization, and perpetual reorganization.

The operation by which life is supported may be illustrated by the operation by which motion is supported and communicated by two cog-wheels acting on each other. Keep your eye steadily fixed upon the point at which the cogs of the two are interlocked. What do you observe? Why, that, at every instant, the empty space which is presented by one wheel, is instantly filled up by a tooth of the other wheel, to be almost instantly emptied again, and again re-filled. Thus it is, that at every point of the body, and at every instant, little empty spaces are made, which are immediately filled by the nutritive arteries, to be again emptied, and again filled.

Another postulate necessary to my foregoing argument, and which is also indisputable, is this—that you



cannot increase the size of your natural body, the substance of your natural fibre, by eating. This is certainly true. For if it were otherwise, the magnitude of the body would be equally enlarged at every point. If you increased its transverse diameter, you must also increase its longitudinal diameter. You could not make it broader without also making it longer. But this is contrary to known fact: for no man can make himself taller by eating; nor add, in the slightest degree, to the length of his fingers and toes. Yet the bones are nourished by the self-same food as the rest of the body, and by the same processes of assimilation.

By eating, therefore, you may superinduce fat over the body; but the magnitude of the solid body itself cannot be increased.

You will be pleased, too, to recollect, that I have already shewn you, (Third Letter) that energetic contractility can only reside in recently-organized matter, and that, therefore, rapid reorganization is absolutely essential to energetic contractility. And I have also, in one of the foregone Letters, proved to you, that all the living actions, external and internal, are performed by virtue of contractility; and that health and strength depend—absolutely depend—upon an energetic contractile power.

Now, then, observe the force and tendency of the following sorites.

Health and strength depend upon energetic contractility—

Energetic contractility depends upon rapid reorganization—

Rapid reorganization depends upon rapid disorganization—

Therefore, health and strength depend upon rapid disorganization.

The first process, therefore, in that chain of processes by which life is not only supported, but in which life really consists, is—what?—Eating?—No:—it is the wasting, the pulling down, the disorganization of the body. You must waste it, before you can nourish it. To the unreflective, this will seem paradoxical. Yet a moment's thought, without the parade of logic, should be sufficient to convince us of its truth. For does not appetite, in the natural order of things, precede the act of eating? And what is appetite, but a sensation warning us that the body has suffered waste, and calling upon us to repair it?

I say, that reorganization depends upon disorganization: because having shown that the body's fibre cannot be enlarged, it is clear that no new materials can be added until a corresponding portion of the old materials has been removed. It must, therefore, be pulled down, before it can be built up—impaired, before it can be repaired—disorganized, before it can be reorganized.

Now, the natural means by which the body is disorganized are, the exhalation from the lungs—perspiration from the skin—the several other excrements—and the formation of the several secretions required for the assimilation of our food; as, the gastric juice, bile, &c. &c.

You know how greatly bodily exertion augments perspiration, and increases the rapidity of breathing—and therefore, necessarily, the quantity of pulmonary halitus, or “breath,” as it is called. Very well;—in like manner, also, it increases all the other secretions—

those several fluids on which the assimilation of our food wholly, and solely, and absolutely depends.

Bodily exertion, therefore, promotes, and that most rapidly and powerfully, the disorganization of the body; and is, in fact, as far as I know, the only means of promoting it: as idleness is the infallible means of retarding it—that is, of retarding those processes, the activity of which are an absolute *sine-qua-non* to health and strength.

By a former syllogism, it has been proved that health and strength depend upon the rapid disorganization of the body: and I have just shown that rapid disorganization can only be effected by rapid exertion, or bodily labour. Hence legitimately arises another important syllogistic truth; thus:—

Health and strength depend on rapid disorganization—

Rapid disorganization depends on rapid exertion—

Therefore, health and strength depend, primarily, on rapid exertion.

From the whole, then, there results this general conclusion;—that there can be no such things as perfect health and strength, without bodily exertion—that it is contrary to the very scheme of man's existence—that it is not in the nature of things—and that the philosophy of life and health, the light of science, the testimony of all ages, and the irresistible force of irrefutable argument, prove it to be impossible.

But there is another powerful argument, proving the necessity of bodily exertion. You must have observed, in reading my former Letters, that everything—no matter what—that everything which is done in the body, is done by virtue of the circulation of the blood.

You must have remarked, that all the phænomena constituting life and health are effected, directly or indirectly, by the circulation ;—that almost thought itself is the result of it ;—most certainly the power of thinking is greatly modified by it.

Seeing, then, that the blood's fluxion is the all-efficient agent by which all the living phænomena are effected, it surely can require no great stretch of faith to feel convinced at once, that if this agent be allowed to doze at its post, infinite mischief must ensue ; and that whatever is capable of keeping its energies in constant activity, is of the very highest value to the welfare of the system. And further, that whatever circumstances—such as, sloth, and the other habits which I have enumerated as conducive to a languid circulation—whatever circumstances are calculated to lull its energies to repose, are in the highest degree detrimental. And the influence which bodily labour exercises over the circulation, everybody knows ;—it is felt in every pulse of the body. Besides, the heart is a muscle, similar in its nature to the muscles of the arm or leg. Exercise, therefore, has the same influence in strengthening the heart (and, of course, through it, the circulation) as it has in strengthening the muscles of the leg or arm ; and most men are well acquainted with its influence in this respect.

But there is yet another view of the subject, which I shall now open to you.

You know that our relation to external things is established by virtue of the sensibility of our organs, and that the degree of sensibility depends upon the degree of mobility of the nerves. I have also shown you how this mobility, and consequently our sensibility,

is increased by a languid circulation, and how it is diminished by a vigorous one—by which the blood is driven energetically into all the capillary vessels, causing their coats to be well distended, so as to exert a constant and steady lateral pressure upon the nerves which run between them.

The circulation, therefore, is a resisting power—a power directly opposed to sensibility. And this resisting power may be carried so far as to produce absolute insensibility; as in those cases of apoplexy, in young, athletic, healthy men, which is the result of plethora—that is, of having too much blood, and too powerful a circulation.

The circulating and sensitive, therefore, are two antagonizing powers. And, as sensibility is the power by which we receive the consciousness of impressions, so the sanguineous circulation is the power by which we resist the consciousness of impressions.

Now, the same impressions will produce both pleasure and pain: the difference being only in the force of the impressing cause. The same impressing cause which, slightly exerted, would yield pleasure, will, if its force be sufficiently increased, be productive of pain. This requires no illustration. But, to increase our impression-receiving power is the same thing as to increase the force of the impressing cause. By increasing, therefore, our sensibility, we virtually increase the force wherewith external objects impress us. And thus it is, that persons whose sensibility is morbidly acute, derive only pain from those causes from which the robust and healthy receive only pleasure. The natural relation between themselves and the external world is destroyed; and they are living in a sphere for which they have



become no longer fitted—with which they no longer possess the necessary and natural affinity. They are now “three-cornered men, thrust into round holes”—they do not fit their position. This morbid sensibility is a source of immeasurable calamity. To all it is the cause of continual irritation and painful sensation; to some it is an exhaustless fountain of misery: witness the lives of J. J. Rousseau, Gilbert, Zimmerman, Cowper, and numerous others; amongst whom, I think, I might mention the late Lord Byron.

But sensibility being the impression-receiving power, and the sanguineous circulation being the impression-resisting power, we have only to increase the latter, in order to diminish the former; and so restore the necessary and natural balance. And this brings me to the point at which I wished to arrive; viz. bodily exertion; this being the only means I know of invigorating the power of the circulation.

This manner of considering the circulating and sensitive powers furnishes a ready answer to that hackneyed and silly question: “How is it that we see men arrive at a good old age, who have, all their lives, been drunkards?”

Let me observe by the way, that these instances are extremely rare: and that they only appear to be frequent, because they are obtruded on our notice as remarkable occurrences. An instance of this kind is never allowed to escape our observation; because man is ever eager to catch at anything which may offer itself as an excuse for indulging in those habits to which his inclination urges him. Every such instance is, therefore, carefully registered; while the thousands who drop daily, like rotten sheep, into premature graves, the

victims of intemperance, are neither minded nor marked. "He died," say they, "of this, or that, or the other disease;"—never stopping to inquire how that disease was incurred.

But the true reason why a few can commit habitual intemperance with comparative impunity is, because, in these persons, the impression-receiving power (sensibility) is naturally exceedingly dull, while the impression-resisting power (viz. the circulation) is naturally extremely vigorous. Their blood, propelled by a large and powerful heart, and rapidly and thoroughly oxidized by capacious lungs, is driven, with energetic force, to every point of the body; thus not only enabling it to resist the impressions of the deleterious matters introduced into the stomach, but also rapidly to repair whatever slight injuries are really inflicted.

There is yet another reason why bodily exercise is indispensable to health. The blood is wholly incapable of fulfilling any of its multifarious and all-important offices (except the secretion of bile) until it has been oxidized in the lungs. The more rapidly, then, that it is driven through the lungs, the larger will be the proportion of it which is oxidized, and so rendered fit to fulfil its function of nourishing the body—the greater will be the proportion contained in the arteries, where alone it is of use, and the smaller will be the quantity of black blood left in the veins, where it is of no use, except as before excepted.

I believe it is possible, by very rapid exertion, to fill almost every vein in the body with arterial blood. I have not room here, to detail the observations which have led me to this conclusion; but I do not speak

unadvisedly. Nor would the secretion of bile be stopped by this state of things ; for it has been proved, that although, under ordinary circumstances, it is secreted from venous blood, yet it can be secreted from arterial.

Now, I do not mean to say that it would be advisable for you to arterialize the whole of your blood. And there is no fear of it ; for it would require greater exertion than any man would, or even could, voluntarily, undergo. But be assured of this, that the greater the quantity of arterial blood, and the less the quantity of black venous blood, contained in your body, the stronger, aye, and the happier and more light-hearted, you will be—and the only means of arterializing the venous blood is bodily exertion. The elasticity of mind and joyousness of heart, which *exercise* proverbially affords, are the direct result of an increase in the quantity of arterial, and a decrease in the quantity of venous, blood. The increase of animal spirits, as well as the increase of animal strength, must always correspond with the increase of arterial blood.

As we breathe for the purpose of oxidizing the black blood, then the oftener we are compelled to breathe, the better ; because every time we breathe, a portion of black blood becomes oxidized, and fit for use. The increased rapidity of breathing consequent upon exertion is an increased rapidity in the function of oxidizing the blood—one of the most important of all the living actions. During exertion we drink, as it were, oxygen from the air. And this oxygen is the only stimulating drink which we can take, with advantage to ourselves, for the purpose of invigorating our strength, and elevating our animal spirits. It is the wine and

spirit of life—the true *eau de vie*—with an abundance of which Nature has supplied us ready made—and it is the only one proper to man. If you be thirsty, drink water—if low spirited, drink oxygen. That is to say, take active exercise, during which you will inhale it.

Besides all this, every time the blood has completed its circle of circulation, a part of the great office of nutrition has been accomplished. The more rapidly the blood, therefore, is, by natural means, circulated through the body, the more rapidly does the process of nutrition go on.

You may compare the living actions to the actions of a hand-cornmill, the heart representing the first wheel, which puts into motion all the other wheels: and bodily exertion may represent the man who turns the crank, attached to the first wheel. Now, the more rapidly the man turns the crank, the more rapid will be the motion of the first, second, third, and all the other wheels; and the more rapidly will the corn be ground. At the same time, if the crank be turned with inconsiderate fury, the machinery may be deranged, and the mill broken.—So, bodily exertion is not to be furious. A horse may be ridden to death;—and, therefore, bodily exertion may be carried too far.

I have said, that persons of sedentary habits become frequently sensible of a feeling of want—a sinking at the stomach, as they express it; which they seek to relieve by eating or drinking. I have said, too, that although these persons require the excitement of a stimulus, yet food or wine does not furnish the stimulus required, but, on the contrary, only adds to the evil. What they want is oxygen.

You know I have all along mentioned four things as

necessary to life ; one of which, you cannot have forgotten, is *stimuli*. But I shall disuse the word “stimuli ;” because being used in the plural, it is awkward to introduce it correctly without periphrasis ; and I will use the word “ excitement ” instead.

The exciting properties of arterial, that is, oxidized blood, I have just been describing to you, while showing you how rapid exercise produces its exhilarating effects ; viz. by increasing the quantity of arterial blood, and driving it, in rapid currents, through all the countless avenues of the brain and body. It is to the lively leaping of the living current, pregnant as it is with the exhilarating wine of life—oxygen—that we owe all the bounding buoyancy, the elastic light-heartedness, which rapid motion and rapid exercise impart. In one of the volumes of Byron’s works is the following note :—“ A young French renegade confessed to Châteaubriand, that he never found himself alone, galloping in the desert, without a sensation almost approaching to rapture which was indescribable.”—The circumstance of this man being alone in a desert had little to do with his rapturous sensations : he owed them to the rapid circulation and oxidation of his blood, produced as the joint effects of rapid exercise and rapid motion. The fox-hunter owes his pleasure to the same causes ; and also the impunity with which he breakfasts on ale and brandy, and sleeps on half-a-dozen bottles of wine, and rises without a headache.

I cannot help inserting here a short extract from a very grateful letter I lately received from Stourbridge : “ It is with gratitude,” says the writer, “ that I send these few lines to show that you have not written in vain. Before I read your work I had generally bad health—



ever since, my health has been excellent, and I feel a happiness within me which I cannot describe. My employment is sedentary, 'chaffering behind a counter, from seven in the morning till eight at night, yet I manage to get a run or a walk of seven or eight miles before business, and can walk fourteen miles before breakfast with ease, which gives me good appetite, good humour, and good health."

Excitement, therefore, my dear John, is necessary; we cannot be healthy without it: and you and I only quarrel about the kind of excitement. This natural necessity for, and craving after, excitement is evinced in the numberless habits to which we addict ourselves, in order to obtain it. The habits of drinking and smoking owe their favour to the temporary excitement they afford. The reason why we crave after these unnatural kinds of excitement is, because we have lost a part of the excitement which is natural and necessary to us. It results from a languid and lazy circulation—a deficiency of oxygen—a gorged state of the venous system with black, devitalizing blood; and a deficiency of that stimulating and vivifying blood, whose colour is vermilion, and which is proper to the arteries. Those distressing sensations of sinking, and want, and languor, and low-spiritedness, of which dyspeptics complain, accrue to them from the same causes. They are deficient in excitement—they want excitement; they want to have their brains, and heart, and whole system, stimulated, spurred, by the exciting properties of vermilion oxidized blood, driven merrily and forcefully to every point of the universal tissue.

We require a stimulant, then, certainly; but the only stimulant which will serve our purpose is arterial blood

in energetic circulation : and the only means to procure this is bodily exertion. “ *Exercitium naturæ dormientis stimulatio, membrorum solatium, morborum medela, fuga vitiorum, medicina languorum, destructio omnium malorum.* ”—“ Exercise is the awakener of dosing nature, the solace of the limbs, the healer of diseases, the chaser of vices, the medicine of listlessness, the destruction of all evils.”

One word more for bodily exertion, as the means of increasing bodily strength ;—and without health there cannot be strength.

Observe the manner in which horses are trained for the course. They are made to undergo more and more exertion, day by day, until the requisite degree of strength has been achieved. Reflect on this :—they strengthen these horses by making them daily undergo severe labour. They do not rest them, in order to strengthen them ; they work them, in order to strengthen them. “ Aye, but,” says some wiseacre, “ a horse is a horse, and a man is a man.” Blockhead !—What then ? We have but to exchange the race-course for the prize-ring, and the argument still remains in full force. Besides, have I not already shown that the actions which constitute the life, health, and strength of a horse, are precisely the same as those which constitute the life, health, and strength of man ?

The prize-fighters will also furnish us with an example of the fact before stated ; viz. that the high degree of contractility consequent upon an energetic circulation is hostile to, and incompatible with, much sensibility ; these fellows becoming almost insensible to blows, unless dealt with an energy capable of felling an ox. They furnish an example, too, of another fact, which I have

already stated (p. 126, in a note); viz., that well-filled arteries and a vigorous circulation are highly conducive—I believe absolutely necessary—to 'equable and amiable temper; for these men are generally remarkably easy and well-tempered fellows. On the contrary, if you seek a perfect example of pettish, irritable, quarrelsome, unforgiving, querulous, snappish, eat-like, unsoothable, spiteful, and sulky temper, you will find it in the Spitalfields' weaver—the poor, dyspeptic weaver, "cabin'd, cribbed, confined," and cramped in his loom for sixteen hours a-day, in a room ten feet square; whose utmost exertion is, to throw a shuttle, four ounces in weight, backwards and forwards, about the length of his arm; and whose longest peregrination is from his own cabin to the counter of the gin-shop, and from the counter of the gin-shop to the door of his own cabin.

The fortitude of the Indian at the stake arises from the same circumstances of a highly energetic circulation. From his habits of life, his circulation is always vigorous, and his sensibility obtuse; but at the moment of torture, its energy is still further augmented, and his sensibility still further blunted, by the enthusiasm and exultation which he feels in maintaining the honour of his tribe, and in disappointing his enemies, who, he knows, are eagerly watching for any symptom of wincing. His circulation in impetuosity resembles a spring-tide; and his body becomes almost insensible to pain.

Again, when the circulation through the brain is highly excited by intense thought, the nerves arising from the brain become almost insensible to the impressions natural to them;—the ear hears not; the eye sees not; the olfactory nerves take no cognizance of odours,

## SLEEP.

' Solidification—that is, the conversion of blood into the solid parts of the body—goes on only during sleep. The chief end, indeed, and object and intention of sleep, would seem to be this final assimilation of our food—this solidification of the blood into the several solid parts of the body.

The accomplishment of this miraculous change seems to have required the perfect concentration of all the energies of the system upon itself. It seems to have required, that the attention (if I may so speak) of the brain and nervous system should not be distracted by any other object. It seems to have required that everything, both within and without the body, should be hushed into profound repose during the accomplishment of this nightly wonder, in order that nothing might disturb or interfere with the exquisite and miraculous processes employed to effect it. To this end, the portals of sensation are closed—the eye sees not—the ear hears not—the skin feels not—the very breathing is scarcely audible—the pulsations of the heart are scarcely perceptible : all the living energies are now concentrated into the greatest possible intensity, like rays of light into a focus ; and directed, with almost complete exclusiveness, towards this simple object.

In the day, therefore, we make blood :—in the night, that blood is converted into solid matter. In the day, we garner up the building materials ;—in the night, we repair the building. The hour of rising, therefore, ought to be the time at which our physical strength is at the greatest ;—and with perfectly healthy persons this is the case. The languor which sickly persons feel

in the morning arises from the process of repair not having been fully accomplished: the building has not been repaired, and therefore its strength has not been restored. The apparent additional strength which is felt, during the day, after eating, is only apparent;—it is merely excitement derived from the stimulus of food; in the first instance in the stomach: and after that food has been assimilated, of new blood in the system.

From all this, we learn two important truths: first, that we should take our severest exercise in the early part of the day: secondly, we learn how and why it is that late suppers are improper.—When you retire to bed with a full stomach, before the process of solidification can commence, the food which the stomach contains must be assimilated. The two operations of solidification and assimilation of food into blood cannot go on together; because, as I have just shown you, the process of solidification requires the concentration of *all* the living energies for its accomplishment. The commencement of this process, therefore, must be postponed until the assimilation of the supper to blood has been completed. But all the living energies, except that of solidification, are diminished in intensity during sleep. The secretion of the gastric and other juices, therefore, necessary for the assimilation of the supper to blood, will go on but slowly, and the completion of the process will be exceedingly protracted; and thus, so much of the season of sleep will be employed in the assimilation of food, that a sufficient portion of it will not be left for the solidification of blood. But this is not all the mischief; for the process of assimilation of the supper into blood has not only abstracted from the process of solidification a portion of that season (the season of sleep)



which ought to have been exclusively devoted to its own accomplishment, but it has also robbed it of a portion of those living energies, the whole of which were due to itself; viz., that portion which has been consumed in the secretion of those juices necessary for the conversion of the supper into blood. When, therefore, the hour of rising arrives, it finds the body still unrepaired and unrefreshed: and the individual still overpowered with sleep, and disinclined to rise.

To conclude:—If you would preserve your health, therefore, exercise, severe exercise—proportioned, however, to your strength—is the only means which can avail you. Recollect, the body must be disorganized, wasted, sweated, before it can be nourished;—recollect the tale of the Dervish and the Sultan;—recollect the mode of training horses for the course, and men for the prize-ring. With plentiful bodily exertion, you can scarcely be ill;—without bodily exertion, you cannot possibly be well. By “well,” I mean the enjoying as much strength as your system is capable of: and if you are in search of some charm, some talisman, which will enable you to indulge considerably in the pleasures of the table with comparative impunity, you will find it in bodily exertion, and in bodily exertion only.

But by exertion or exercise, I do not mean the petty affair of a three-miles’ walk: I mean what I say—bodily exertion, to the extent of quickened breathing and sensible perspiration, kept up for three or four hours out of the twenty-four;—say, four or five miles before breakfast, four or five before dinner, four or five early in the evening; or to save the evening for other purposes, a healthy man may walk ten or a dozen miles before breakfast, with an advantage to himself which

will, in a week or two, perfectly astonish him. Most men, even the operative manufacturers and shopkeepers, may do this, if they will take the trouble to rise early enough;—and, fortunately, the exercise taken before breakfast is worth all that can be taken afterwards.

It would be easy to show, that the health and strength of the mind is as much under the control of the circulation as is the health and strength of the body.—But I have already exceeded my limits.

Rules of diet, therefore, are of little use; and that little, only to those who cannot take the necessary degree of bodily exercise. The stomach of a healthy man will dissolve polished steel of the finest temper. What difference can it make to such an organ, whether it receives roast or boiled meat, eggs, oysters, cheese, butter, bread, or potato? and whether these articles have been thoroughly and minutely broken down by the teeth, or only imperfectly so? Sir Richard Jebb, when his patients asked him what diet they should use, was in the habit of replying, “Why, my dear madam, don’t eat the fender and fire-irons, because they are decidedly unwholesome; but of any other dish you may freely partake.”

But, to those who, from any cause, cannot take bodily exertion, some attention to diet may be necessary. Even here simplicity and quantity, rather than quality, form the grand consideration. They cannot well take too little food; and wine and other strong drinks are wholly inadmissible. And let them only reflect on the mechanism of nutrition; on the manner in which our food nourishes us—what becomes of it after we have eaten it; and they cannot but clearly see that this advice is sound and wholesome doctrine.

Authorities without proof are of little value; otherwise, I could quote them in abundance, from all sorts of authors, in all ages of the world. But if you will not believe the evidence of such arguments as I have already adduced, neither would authorities convince you, though their name were Legion. I shall, however, conclude this Letter with four.

“The pith of nearly all that has been written on *hygiene*,” says Dr. J. Johnson, “or the prevention of diseases—and of the Protean disorder among the rest—might be included under two heads, almost in two words—*temperance* and *exercise*.” Again: “Disorders of the body, in these days, are engendered and propagated, to a frightful extent, by moral commotions and anxieties of the mind. And if I have proved that *corporeal exertion*, especially when aided by any intellectual excitement or pursuit, can obviate the evils that ensue to soul and body from these causes, I shall do some service to the community. The principle in question is neither Utopian, nor of difficult application: it is within the reach of high and low—rich and poor—the learned and unlettered. Let moral ills overtake any of these, and he is in the high way to physical illness. To prevent the corporeal malady, and to diminish, as much as possible, the mental affliction itself, the individual must tread in the steps—*hauri passibus aquis*—of Xenophon and Byron. He must *keep the body active and the stomach empty*.”

“Exercise,” says Hakesworth, “gives health, vigour, and cheerfulness, sound sleep, and a keen appetite. The effects of sedentary thoughtfulness are, diseases that embitter and shorten life—interrupted rest—tasteless meals—perpetual languor—and ceaseless anxiety.”

“Temperance,” says Burton, “is a bridle of gold; and he who can use it aright, is liker a god than a man.”

But—I beg your pardon—I must make another short quotation, which has this moment occurred to me:—one which, though exceedingly short, embodies in itself the truth and wisdom of a hundred volumes: it is the following brief aphorism of the late Mr. Abernethy: with which I shall conclude:—“If you would be well, live upon sixpence a day, and earn it.”

I am, my dear John,

Yours very truly,

E. JOHNSON.

FINIS.





## APPENDIX.

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SINCE the publication of the eighth edition of this work, a new mode of treating certain diseases has been introduced into this country under the name of Hydropathy.

Shortly after its introduction, I received several letters, wherein it was stated, that if the opinions expressed in my work on Life, Health, and Disease were sincere, they (the writers of these letters) thought I was bound to advocate the Hydropathic treatment, because, they said, the *principles* and doctrines involved in that treatment are identical with the *principles* and doctrines taught by me in that work. I also received, shortly after the receipt of these letters, a note from Captain Claridge, requesting leave to call on me. "For," said he, in his note to me, "I have just been reading your work on Life, Health, and Disease, from which I perceive that you are a *ready-made Hydropathist*." After my conversation with Captain Claridge, I immediately started for Græfenberg, where I spent one entire winter. During my residence there, I had the most ample opportunities of observing the effects of the treatment as practised by Priessnitz. I soon became most thoroughly convinced that the Hydropathic method, though not capable of curing all diseases, as some visionary enthusiasts believed, nor of entirely taking the

place of medicine and the lancet, to the total exclusion of both; yet that, as a whole, it formed a system infinitely superior to all other systems of cure, and more generally applicable, safe, and successful. I found, too, that it was particularly useful in precisely those cases in which drugs were avowedly of no use at all—as chronic rheumatism, chronic debility, spinal weakness, indigestion, constipation, consumptive diathesis, and a whole host of nervous affections, head diseases, and irregular and undenominated ailments, which defy classification. I returned home determined to advocate and adopt it—and I thank God that I have hitherto been enabled to do so with a success beyond my most sanguine expectations.

The chief object of this work has been to recommend exercise, and a more free exposure of our persons to the influences of the weather, as remedial and conservative measures of high value. And I have explained how these operate upon the body—viz. by accelerating the *disorganization* and *reorganization* of the body—by *more rapidly expelling the old and worn-out material, and supplying its place by new*. Now this is precisely the mode in which the Hydropathic treatment operates, as demonstrated by Liebig in his great work on Animal Chemistry—and as also shown by me in my “Theory and Principles of Hydropathy.” Frequent cold bathing and sweating have precisely the same effect on the body as exercise. They accelerate what Liebig calls the **CHANGE OF MATTER**—that is, the daily disorganization and reorganization of the elements of the blood and vital organs. But, in addition to frequent cold bathing and sweating, Exercise and almost constant exposure to the weather, form most important elements in the Hydropathic treatment.

Not to have adopted, therefore, this treatment, would have been, in my case, to become a renegade from my own principles and doctrines.

As practised by Priessnitz, however, there is much in the treatment which is unscientific, and something which is both absurd and dangerous—at all events to English

constitutions—which differ widely from the German. I do not say this to detract aught from his merit, which is undoubtedly great. But I presume it will not be denied by any one that, had Priessnitz had the advantage of a medical education, or indeed any education at all, his treatment would have been much more perfect, and his success much more uniform and certain.

There is no part of that treatment which is wholly new. The wet sheet, wet body-bandages, sweating, cold bathing, exercise, and free exposure to the weather, have each, in its turn, been recommended by various writers and practitioners before. The great merit of Priessnitz consists in his having accumulated all these various remedial measures into one great system, bringing them all simultaneously to bear upon the patient as one treatment—which treatment must, (in chronic cases), and *for the time being*, constitute the business of the patient's life.

There is another point on which the Hydropathic treatment has a strong analogy with the doctrines taught in this work—I mean its total rejection of all Aleoholic Stimulants as beverages.

As might have been expected, the Hydropathic treatment, on its first introduction, met with the most violent opposition on the part of medical men. One physician to one of our largest Metropolitan Hospitals gave a lecture to his pupils, which lecture was expressly devoted to instructing them in what they were to say, and how they were to act, should any of their patients, when they got into practice, consult them as to the propriety of trying this new treatment. They were not to run it down—not to ridicule it—because that, said he, would be the certain way to induce them to resort to it. On the contrary, they were to speak of it with respect—to acknowledge that it was useful in certain cases, and certain constitutions—but always to conclude by assuring the patient that in *his* or *her* particular case it would be highly improper and extremely dangerous. And this is the ruse—this the quirk—practised by the great bulk of medical men up to the present moment. They have

ceased to rail at it—ceased to laugh at it. They admit that they sometimes recommend it. But they always conclude by assuring the patient that *his* own case is one in which it is totally inadmissible.

I am rejoiced to perceive however that many among the more intelligent and higher standing in the profession are beginning not only to acknowledge its value, but even to introduce it into their practice. In the last number of the British and Foreign Medical Quarterly, Professor Forbes (its Editor) has a long article, written with the most manly frankness, by himself, on the subject of the Hydropathic treatment. In this article he has, in the most unequivocal language, boldly declared his conviction that it is a treatment of great power and value in a multitude of cases, both chronic and acute—and moreover that it is not a whit more dangerous than the ordinary drug practice, in the hands of properly educated medical men. “If it shall appear, however,” says Professor Forbes, “*as we believe it will*, on further examination, that the external application of cold water is capable of being beneficially applied in the cure of diseases in *modes of greater efficacy*, and to a *much greater extent*, than has been hitherto practised by medical men, there remains only one course for the members of the profession to pursue, viz. to *adopt the improvements*.”

Again: “Let us then consider a little further the consequence of repeated applications of cold, supposing, for the sake of argument, it is used with due reference to the constitutional powers, so as to create an increased activity of the vital functions. It appears to us that this *is exactly the thing needed* in the treatment of a *great many cases of chronic ailments*.”

“In conclusion, we will venture to place on record the following as *among* the more important impressions which have remained on our mind after a careful examination of the whole subject. In a large proportion of cases of gout and rheumatism, the water-cure seems to be extremely efficacious. After the evidence in its favour, accessible to every body, we think medical men

can hardly be justified in omitting, in a certain proportion of cases, at least a full trial of it. No evidence exists of any special risk from the water practice in such cases."

"In that very large class of complex disease, usually known under the name of chronic dyspepsia, in which other modes of treatment have failed, or been only partially successful, the practice of Priessnitz is well deserving of trial."

"In many chronic nervous affections and general debility, we should anticipate great benefit from this system."

"In chronic diarrhœa, dysentery, hæmorrhoids, the sitz bath appears to be frequently an effectual remedy."

"We find nothing to forbid the cautious use of drugs in combination with Hydropathic measures. On the contrary, we are convinced that a judicious combination of the two is the best means of obtaining the full benefit of each. The water-cure contains no substitute for the lancet, active purging, and many other means necessary for the relief of sudden and dangerous local maladies. The banishment of drugs from his practice was necessary, and perhaps natural, on the part of Priessnitz: *the like proceeding on the part of qualified medical men, superintending water establishments in this country, evinces ignorance, or charlatancy, or both.*"

"With careful and discreet management, in the hands of a properly qualified medical practitioner, the water-cure is very rarely attended with danger."

"Notwithstanding the success of the founder of Hydropathy, (Priessnitz), its practice by non-professional persons can neither be fully advantageous nor safe."

"Many advantages would result from the subject being taken up by the medical profession. The evils and dangers of quackery would at once be removed from it. Its real merits would soon be known. The tonic portion of its measures might then be employed in conjunction with special remedies of more activity, which, no doubt, would often prove exceedingly beneficial."



“Finally, it must always be remembered that the distinction between quacks and respectable practitioners is one, *not so much of remedies used*, as of skill and honesty in using them. Therefore, let our orthodox brethren be especially anxious to establish and to widen, as far as possible, this distinction between themselves and all spurious pretenders.”

I need hardly add that I quite agree with these conclusions of Professor Forbes; especially that Hydropathy can never operate to the total exclusion of either drugs or the lancet—although undoubtedly it will diminish, to a very important extent, the *frequency* of the use of both—and that it cannot be either safely or advantageously practised by non-professional persons.













